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THE WORKS

OF

FRANCIS BACON,

Lord Chancellor of England.

A NEW EDITION:

BY

BASIL MONTAGU, ESQ.

VOL. XV.

LONDON:
WILLIAM PICKERING.
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THE

THEORY OF THE FIRMAMENT.

But as so many foiling inconveniences are found to spring up on all sides, it should be deemed satisfactory if any thing can be avouched less revolting.

Let us, therefore, construct a scheme of the universe, according to that measure of history hitherto known to us, reserving for our future judgment all new lights, after history, and through history, our philosophy, by induction, may have reached a maturer age. But we will, in the outset, premise some points that have reference to the matter composing the heavenly bodies, whence their motion and formation may be better understood; afterwards setting forth our thoughts and ideas of that motion itself, the chief subject under discussion.

Nature then, in the separating of matter, seems to have drawn an impassable bar between the rare and dense, and to have assigned the globe of the earth to the order of the dense; but every thing, from the very surface of the earth, and its waters, to the utmost extremity of the firmament, to that of the rare or volatile, as it were, to twin classes of first principles, not indeed of equal but of suitable portions. Nor indeed does either the water clinging to the clouds, or the wind pent up in the earth, disarrange this natural and appropriate position of things: but this difference, between rare or volatile, and dense or tangible, is entirely primordial or essential, and is what the system of the universe chiefly has recourse to. It proceeds from a state of things the most simple possible—this is from the abundance and scarceness of matter, in proportion to its extension. What belong to the order of subtile or volatile, as

found here among us, (we are speaking of those bodies that are simple and perfect, not of such as are compounded and imperfectly mixed,) are clearly those two bodies, air and flame. But these are to be propounded as bodies utterly heterogeneous, not, as is commonly supposed, that flame is nothing else than air set on fire. To these correspond, in the higher regions, the ætherial and sidereal nature, as, in the inferior, water and oil, and in the still deeper parts, mercury and sulphur, and generally crude and fat bodies, or, in other words, bodies that have a repugnance to, and such as are susceptible of, flame; (for salts are of a compounded nature, consisting of crude and at the same time also of inflammable parts). It is now to be seen by what compact these two great families of things, air and flame, shall have occupied by far the greater part of the universe, and what are those parts they hold in the system. In air nearest to the earth, flame lives but a momentary life, and utterly perishes. But after the air has begun to be more depurate from the effluviæ of the earth and well rarified, the nature of flame through various* adventures explores its way, and tries to take its station in the air, and after a time acquires some duration, not from succession, as with us, but in identity;† which takes place for a time in some of the feebler comets, which are in a manner of an intermediate nature between a successive and a fixed flame; the flamy nature however is not fixed or established, before its arrival at the body of the moon. There the flame lays down its extinguishable part, and protects itself on all sides, but yet it is a flame, weak without vigour, and having little of radiation of that kind; that is, neither vivid from its own nature, nor much excited by a contrary one; neither is it sincere, but, from its composition with an etherial substance, such as is there met with, it is stained and mixed up. And in the region of Mercury flame has not very plentifully established itself, since, by the accumulation of its whole amount, it is able to form only a small planet, and that withal labouring and struggling, like an ignis fatuus, with a great and highly disturbed diversity

* Per varios casus, per tot discrimina rerum, Virg. Æn. iii. 208. 'Per varios casus tentat et experitur,' may be translated 'after various adventurous efforts tries,' or, 'adventurous through many casualties tries.'

† Identitas: quævis actio repetita.

of fluctuating motions, and not bearing to be separated but for a small distance from the guardian protection of the sun. Moreover, after we arrive at the region of Venus, the flamy nature begins to gain strength and to wax brighter, and to be collected into a globe of a tolerable size; nevertheless she also is the handmaid of the sun, and shudders with an abhorrence of any greater recession from him. But in the region of the sun, flame is set, as it were, on a throne, the mean being among the flames of the planets, for there it is stronger and more glittering than the flames of the fixed stars, on account of the greater restraining* influence shed all around, and the closest possible union. But flame in the region of Mars is observed to be likewise powerful, denoting by its splendor the sun's vicinity, yet existing of its own proper virtue, and admitting of a separation from the sun to the extent of the whole diameter of the firmament. In the region of Jupiter, however, flame, laying aside, in a gradual manner, this emulation, appears more serene and clear, not so much from its proper nature, (as the planet Venus, she being more sparkling,) but from being less moved and excited by the nature spread around him;† in which region it is probable *that* takes place, which Galileo devised, to wit, that the firmament there begins to be studded with stars, although from their minuteness invisible. But again, in the region of Saturn the nature of flame seems to become somewhat languid and faint, as being both farther removed from an alliance with the sun, and exhausted by the neighbouring constellated firmament. Lastly, a flamy and sidereal nature having overpowered the ætherial nature, gives a constellated firmament composed of an ætherial and sidereal nature, as the globe of the earth is of continent and waters scattered up and down on this side and that side, the ætherial substance being however overruled, subdued, and assimilated, so as to thoroughly endure and become subservient to the sidereal. Wherefore, from the earth to the summit of the firmament are found three

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* Antiperistasin: περίστασις signifies, generally, 'circumstance:' but in Athen. l. 5. it also denotes 'circuitus': αἱ δὲ τῆς περιστάσεως θύραι τὸν ἀριθμὸν εἴκοσι οὖσαι, portæ, quæ in circuitu erant, viginti, &c.; therefore the illustrious author may mean by 'antiperistasis' the attractive influence of the sun opposed to, and which detains [cohibet] the planets in their orbits.

† Or, "from the nature spread around him being less," &c. according as irritata and exasperata are taken in the nominative or ablative case.

genera of regions, and, as it were, three stages, as relate to the region in which flame is extinguished, the region in which flame disperses itself; moreover, to quibble about contiguity and continuity in soft and flowing bodies, would be an utter vulgarism. Nevertheless that point should be understood, namely, that nature is accustomed to advance to spaces by gradual steps, then, of a sudden, by leaps, and to alternate this sort of process, otherwise no fabric could be formed did she always proceed by insensible degrees; for what a jump as respects the expansion of matter is there from water to air, even ever so dense or clouded, and yet these bodies, so different in their nature, are joined together in position and superficies without any medium or interposing distance: nor is it a less leap as to a substantial nature, from the region of the air to the region of the moon; in like manner, a prodigious one from the firmament. Wherefore if any one shall have taken for continuous and contiguous, not from the manner of their annexation, but from the diversity of the bodies connected, those three regions we have spoken of, they can only be held for contiguous in their limits.

But now it is time to notice, in a clear and explicit manner, the amount and nature of what this our theory, relating to the substance matters of a system, may establish, as also of what it may give the negative to, in order that it may be maintained or overthrown. It denies that vulgar opinion, that flame is air ignited, by affirming that those two bodies, air and flame, are clearly heterogeneous, like water and oil, sulphur and mercury. It negatives that *vacuum coacervatum* held by Gilbert, to obtain among the scattered spheres, but affirms that the spaces are filled either with aerial or a flamy nature. It denies that the moon is an aqueous, or a dense, or a solid body, but affirms that it is of a flamy nature, though it be gentle withal and weak, being indeed the first rudiment and the last sediment of cœlestial flame; since flame, (according to its density), no less than air and liquids, admits of innumerable degrees. It establishes that flame, justly and freely posited, becomes fixed and subsists, no less than air and water; nor is it a momentary thing, and only successive in its bulk, by renewal and feeding, as is the case here with us. It maintains that flame has a natural tendency to go and collect itself into globes, after the manner of an earthy nature, but not at all like air and water,

which are gathered together in orbs and the interstices of globes, but never into perfect globes. It avers that the same flamy nature in the proper place, (that is) in the constellated firmament, is dispersed in infinite round atoms, but yet in such sort that that twofold principle of pure air and constellation be not put off, nor yet flame extended to the heaven of heavens. It affirms that stars are real flames, but that the actions of flame in the heavens should in no wise be wrested into a comparison with the actions of flame with us, most of which operate by casualty. It affirms that the ether interspersed among stars, and the stars themselves, have respective relations to air and flame, but sublimated and rectified. And thus with respect to the substance of the constitution or system of the universe, some such ideas as these have suggested themselves to our mind.

We must now speak of the motions of the heavenly bodies, on account of which we have adduced these premises. It appears reasonable to suppose that rest is not excluded from nature as to any whole (for we are not now discoursing of small parts). This (waiving logical and mathematical subtleties) is mainly evident from the fact, that the inciting causes, and the velocities of the heavenly motions, gradually slacken themselves, as tending to ultimate cessation, and because that even the heavenly bodies partake of rest, hard by the poles, and because, if immobility be excluded the system, it is dissolved and dissipated. But, if there be a certain accumulation and mass of matter of an immoveable nature, there seems no further room to doubt that it is the globe of the earth; for a dense and close cementing of matter disposes toward a languid and reluctant motion; as, on the contrary, a loose unfolding of it towards a brisk and ready one. And not without reason did Telesius, (who revived the philosophy and discussions of Parmenides in a treatise on the principle of cold), introduce into nature, not indeed a co-essentiality and coupling (which was his wish), but, however, an affinity and agreement, to wit, on one side, of hot, shining, rare, and immoveable, and, on the opposite part, of cold, dark, dense, and immoveable, by placing the site of the first harmony in the heavens, of the second on the earth. But, if rest and immobility be conceded, it seems fit that we also suppose a motion without limit and to the uttermost moveable, especially in natures opposed to

each other. This motion is commonly rotatory, such as is generally found in the heavenly bodies; for motion in a circle has no termination, and seems to flow from a natural desire of the body, which moves, only that it *may* move, and follow itself, and seek its own embraces, and excite its nature, and enjoy it, and exercise itself in its proper operation; whereas a motion in a right line may seem a finite journeying, and a movement to a boundary of cessation or rest, and that it may attain something, and then quietly lay down its motion. Wherefore respecting that rotatory motion, which motion is true and perennial, and commonly supposed peculiar to the heavenly bodies, we must inquire how it equips itself in the outset, and by what rate of conduct it incites and checks itself, and what the nature may be of those influences which really act upon it. In our progress of unfolding these things, we will refer to computations and tables, that beautiful mathematical dogma (that all motions are restrained to circles, perfect, or eccentric, or concentric), and that high flown dictum (that the earth is, in respect of the firmament, like a point of no magnitude), and many more feigned discoveries of astronomers. But first we will divide the heavenly motions: some are *cosmici*, others *ad invicem*. Those we call *cosmici*, which the heavenly bodies acquire from the consent not only of the heavens but of the universe: those *ad invicem*, in which some heavenly bodies depend on others: and this is a true and necessary division. On the supposition, then, of the earth standing still (for that at present appears to us the truer hypothesis), it is manifest that the heavens are carried round by a diurnal motion, the measure of which motion is the space of twenty-four hours, or thereabouts; and, consequently, the revolution is from east to west, upon certain points, (which they call poles,) south and north: moreover the heavens are not whirled round moveable poles, nor, back again, are the points different from those stated; and this motion verily seems in harmony with universal nature, and therefore sole, except as far as it admits both of decrements and declinations; according to which decrements and declinations this motion shoots through every thing moveable, and pervades all space, from the constellated firmament even to the very bowels and inmost recesses of the earth; not by any snatched or harassing course, but by perpetual consent;

and that motion in the constellated firmament is perfect and entire, as well as to a just measure of time, as by a full restoration of place; but, inasmuch as that motion recedes from the summit of the heavens, insomuch does it become more imperfect, with reference to its slowness as well as its aberration from a circular motion. And, first, we must speak distinctly of that slowness. We affirm, that the diurnal motion of Saturn is too slow to carry it round, and restore it to the same point in twenty-four hours; but that the starry firmament is carried on quicker, and outstrips Saturn by such an excess, as, in as many days as complete thirty years, would agree with a whole circuit of the heavens. The same is to be said of the rest of the planets, according to the difference of the periodic time of each planet; so that the diurnal motion of the starry firmament (in that same period, without any regard to the magnitude of the circle) is nearly by one hour swifter, than the diurnal motion of the moon; for, if the moon could complete its revolution in twenty-four days, then that excess would be one whole hour; wherefore that much talked of motion, in an opposite and contrary direction from west to east, which is attributed as peculiar to the planets, is not true, but only apparent, from the outstripping of the starry firmament toward the west, and the leaving behind of the planets toward the east, which being granted, it is evident that the velocity of that cosmical motion, by an unperturbed law of nature, as it descends, decreases, so that the nearer each planet approaches the earth, the slower it moves; whereas the received opinion overthrows and turns upside down that law; and by attributing a motion of their own to the planets, falls into the absurdity, that the planets, the nearer they are to the earth (which is, naturally, the place of rest), in that ratio have their celerity increased; which astronomers, in the most trifling and unsuccessful manner, attempt to excuse, by a relaxation of the force of the primum mobile. But if it seem to any one a matter of wonder, that, in spaces so vast as interpose between the starry firmament and the moon, that motion should gradually decrease by portions so small, by less, to wit, than one hour, which is the twenty-fourth part of the diurnal motion; it subsides when we consider that each planet, the nearer it is to the earth, completes lesser circles, revolving in a shorter circuit; so that, the decrement of the size of the circle being added to the

decrement of the periodic time, that motion is perceived to decrease in a marked manner. Up to this time we have spoken of the velocity, absolutely and apart, as if the planets, placed, for example, in the plane of the equator, or of any of its parallels, were simply overtaken by the starry firmament, and by one another, but yet in that selfsame circle; for this would be a mere leaving behind without any respect to obliquity. But it is manifest, that the planets not only hasten on their course with unequal relative speed, but do not return to the same point of a circle, but decline towards the south and the north, the limits of which declination are the tropics; which declination has produced a circle oblique to us, and its different polarity; after the same manner, that that inequality of velocity has caused the motion of an opposite action. Nor really is there need of this figment in the nature of things, since by introducing spiral lines (the thing that comes nearest to sense and fact) the matter in dispute may be settled, and those points be safe and sound. Besides (which is the sum and substance of the matter) these spirals are nothing else than deviations from a perfectly circular motion, which the planets cannot bear; for in proportion as the substances degenerate in purity and expansion, so also do their motions. But it happens, that as in point of celerity the higher planets are carried on quicker, and the inferior slower; so, also, that the superior planets form spires that approximate * and more nearly resemble circles, but the inferior curves more disjoined and eccentric; for, by descending more and more, there is a perpetual departure both from that prime state of velocity and that perfect circular motion, by a law of nature no where interrupted. In this however the planets agree, (as bodies retaining much of a common nature, though in other respects differing,) that they have the same limits of declination. For neither doth Saturn return within the tropics, nor does the moon stray beyond the tropics (and yet we must not dismiss from our consideration what has been handed down and remarked by some upon the wanderings of the planet Venus), but all the planets, whether superior

* Propiores, if not misprinted for propriores, must respect the foci of the ellipses; which explains "disjunctas:" but, if the illustrious author did write propiores, why did he afterwards tautologize by saying "quæque circulos propius referant?"

or inferior, after their arrival at the tropics, turn themselves, and recommence a course back again, weary of a lesser spiral range, such as they would have to undergo, if they did approach nearer the Poles; and dreading that loss of motion as destructive of their nature. For howsoever it may be, in the starry firmament, both the stars near the poles, and those about the equinoctial, preserve their ranks and positions, reduced into order, one by another, with steadfastness and consummate uniformity; nevertheless the planets seem to be of that mixed nature, that they admit not willingly an ampler circuit, nor bear at all a shorter. Furthermore, these doctrines concerning the heavenly motions seem to us somewhat preferable to forced and opposite motions, and of a different polarity of the Zodiac, and an inverted order of velocity, and such like, which in no way agree with the nature of things, though they may in a manner accord with calculations. Neither have eminent astronomers been blind to these matters, but, wrapped up in their craft, and reveries of perfect circles, catching at subtleties and the evil results of a fashionable philosophy, they have disdained to follow nature. Truly, however, is that despotic decretal against nature of wise men more mischievous, than the very simplicity and utter credulity of the uninformed, when any one, for instance, looks with scorn at truth, because it is manifest. And yet huge is that evil, and most widely extended, that the human intellect, whenever it finds itself unequal to subjects, has a predilection to soar above them.

But now we must inquire whether that one and simple motion in a circle, and in a spiral curve, from east to west, upon certain south and north poles, cease and terminate with the heavens, or it also be conveyed down to things beneath. For it would not be ingenuous in us to feign here in this nether region such aphorism as they suppose with respect to the heavens. Wherefore, if in these regions be also found that motion, it will appear that, even in the heavens, it is of like kind, according to a nature common or cosmical, with that we experience. In the first place then it is plainly evident, that it is not confined to the limits of the heavens. But the demonstrations and proofs of this matter we have fully laid down in our *anticipation* respecting the flowing and ebbing of the sea; therefore, to that we refer; and this being supposed and taken for granted, we will proceed to the rest of the heavenly motions. But

these we have said are not cosmical, but reciprocal. There are four kinds of motions visible in the heavens, besides that which we have called cosmical, which is a diurnal motion in curves within the tropics. For either the stars are raised higher, and again depressed lower, as they may be farther from and nearer to the earth; or they bend and wind themselves through the latitude of the Zodiac, by running out more to the south, or more to the north, and by traversing what they call the dragons;* or they vary from an incited and also an acquisitive motion† (for we join together these two), advancing sometimes quicker, sometimes slower, sometimes progressively, sometimes retrogressively, sometimes even stopping and staying; or at a certain distance from the sun, they are more or less bound together and drawn round each other. We will recount the causes and natures of these only, generally touching the heads of each; for our present undertaking requires that to be done in this place. But in order to this, and to secure beforehand, as well as to open the way, we must frankly declare our sentiments upon some of the maxims of philosophers, as also upon certain hypotheses of astronomers, as well as their observations during several ages, out of which materials they built up their mysteries; all which things appear to us to be full of error and confusion. Wherefore there are axioms, or rather certain conceits, which, received by philosophers, and transferred to astronomy, and unfortunately being credited, have corrupted the science. Our rejection of them will be simple, as well as our judgment upon them; for it is not suitable to waste precious time on silly refutations. The first of these is, that all things above the moon inclusively are incorruptible; and in no degree or form whatever do they undergo new beginnings or changes; of which it has been said elsewhere, that it is a fond and silly saying. Indeed, from this source proceeds that prodigious evil, that, on the appearance of every irregularity astro-

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* The twelve signs of the *Zodiac*, I presume; so called, because most of them resemble some living creature; thus Eurip. in Oreste has Δρακοντώδης, "draconibus, seu anguibus plenus;" or it may mean the two Nodes, which comes to the same thing, represented by the head and the tail of the Dragon; for the ascending Node and Dragon's head have the same character to denote each (☊); so likewise the descending Node and Dragon's tail (☋).

† Consecution, used by Newton; does it mean "picked up on its revolution," or an orderly accompanying, &c.; a relative motion; or a train of *consequential* motion, incitatio referring to *original*?

nomers shape new and, as they suppose, corrected theories, and adapt causes eternal and invariable to things more frequently, as it were, fortuitous.

The second is that those turbulent actions of compression, expansion, resistence, and yielding, which seem to be produced by a certain softness and hardness of bodies, taken for elementary qualities, are not compatible with the heavens, which is doubtless of the fifth and least elementary essence. But this assertion is a presumptuous and arbitrary reprobation of things and sense. For wheresoever any body in nature is in a state of rest, there also is a reluctance to change, and that in proportion to the size of the body. But wherever are natural bodies, and a local motion, there will take place either repulsion, or a yielding, or a resolution of motion;* for those things which have been named compactness, looseness of parts, resistance, a giving way, with many others, are what matter universally undergoes every where. Yet, however, from this source have come down to us all that multiplicity of orbits capriciously jumbled together, which, nevertheless, they are pleased to say are so distinctly interlineated, and which move and turn within each other so evenly and glibly, that, notwithstanding their intricacy, there is no entangling or vibration; all which are visionary and a palpable mockery of facts.

A third is, that to each individual body appertains a peculiar and appropriate motion; and if more motions are observable, all, except one, are extrinsic, and derived from some other moving body. Nothing falser than this can be conceived, since all bodies, from the manifold consent of things, are endued with even many motions, some denoting their nature, others waxing weaker and weaker, others even lying hid until they be drawn forth; but there are no special or proper motions of things, except the exact measures and ratios of common motions. And hence again has been presented to us that primum mobile severed and made distinct, and heavens on heavens, and newfangled mansions contained in them, that they may suffice for the performances of so many different motions.

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* Sectio means, classically, a confiscation of goods, division of spoil, &c. so, possibly, here it may mean dissipation of motion; if the illustrious author uses it here for secutio (a sequor) then it means an "orderly following" (consequentia επακολουθησις); but such a word in such a sense is utterly unclassical.

The fourth is, that all heavenly motions are distributed through perfect circles; which is a very cumbrous doctrine, and has produced to us those monsters of eccentric curves and epicycles; whereas, however, had they consulted nature, a regulated and uniform motion belongs to a perfect circle; but a motion, regulated indeed, but of different forms, such as is found in many of the heavenly bodies, is the property of other lines; and with good reason Gilbert ridicules these, because it is not likely that nature should have formed wheels, which, for example, contain one or two miles in circumference, in order that a ball of a finger's breadth should be sustained: for of so little magnitude does the body of a planet appear to be, compared with those circles round which they pretend it is to be carried.

The fifth is, that stars are parts of their sphere, as if fixed therein by a nail. But this is most clearly a reverie of those who deal in mathematics, not in nature, and are so stupidly intent on the motion of bodies, that they entirely forget their substances. For that fastening is a particular disposition of compact and consistent things, which have firm cohesions, because of the pressures of the parts. But it is utterly to be unlooked for, if it be applied to soft or liquid substances.

The sixth is that a star is a denser part of its sphere of action; for the stars are not only not parts, but neither are they denser; for they are not homogeneous with ether, and that in degree only, but they are entirely heterogeneous, and differ in substance; and, besides, that substance, as to density, is rarer, and more expanded than an ethereal one. Over and above these there are many other conceits of equal whimsicality; but these shall suffice for the subject now under discussion. Again, these observations have been made on the fanciful dicta of philosophy respecting the heavens. But as to what respects the hypotheses of astronomers, the refutation of them is generally without any use; for neither are they asserted for truths, nor is it impossible that, although they may vary and be contradictory in themselves, the phenomena should equally be preserved and harmonize. Therefore, if you please, between astronomy and philosophy, as if linked together by an expedient and legitimate bond, be so circumspect a mediator, that, on the one hand, astronomy may have her previous hypotheses, which are best adapted to expedite calculations; on the other, philosophy, such as approach nearest to the truth of nature; and so that the hypotheses

of astronomy may not prejudice the truth of a thing, and that the decisions of philosophy may be such as may easily be explained with regard to the phenomena of astronomy. And so much for hypotheses.

Now as to astronomical observations, which are assiduously accumulated, and continually are pouring down like water from the sky, I have a great wish to admonish men on that head; lest, haply, that be true of them, which is so elegantly fabled of the fly in Æsop, that sitting on the harness of a chariot, contending for victory at the Olympic games, cried out, "see what dust *I* excite!" Just so, any petty observation, vacillating, at one time, in the instrument, at this, in the eye, and at that, in a calculation, and which possibly may be a reality, on account of some true change in the heavens, calls into existence new firmaments, new spheres, and new circles. And we do not make these remarks in order that any relaxation in the taking of observations or the study of history should take place, both which we are of opinion should by all means be stimulated and intently prosecuted; but only that, in rejecting or changing hypotheses, the highest prudence and a mature gravity of judgment be displayed.

Wherefore, having now laid open the road as to the motions themselves, we will say a few words also as to their nature. We have already said, then, that there are four kinds of motions of the higher order in the heavens: an ascending and descending motion through the whole expanse of the heavens; a motion, to the breadth of the Zodiac, stretching out towards south and north: a motion in the course of the Zodiac, quick, slow, progressive, retrograde, stable; and the motion of elongation from the sun. And let not any one object, that that second motion of the breadth of the Zodiac or of the signs* thereof may be referred to that great cosmical motion, since there is an inclination by turns towards the south and the north; which as well as the curves themselves from one tropic to the other are alike, except that the latter motion is merely curvilinear, but the former hath also many turnings, and lies inmost at much less distances.† For neither hath this point escaped our consideration. But assuredly the constant and perpetual motion of the sun in the ecliptic, considered apart from all latitude and exclusively of the

* See note on "dracones," page 10.
† "Te sinuoso in pectore fixi."—*Pers.* 5, 27.

signs of the Zodiac, which same sun does yet communicate with the rest of the planets, as to their paths within the tropics, does not allow us to entertain this opinion. Wherefore we must seek for different sources of this and of the other three motions. And these are the points, with regard to the heavenly motions, which appear to us to be fraught with a less degree of inconvenience. But we must see what they may be found to deny, and what to affirm. They deny that the earth revolves. They deny that there are in the heavens two motions from the east to different points of the west; and they affirm one, that outstrips and consequently leaves behind others. They deny any oblique circle and its different polarity, and they affirm spiral curves. They deny a primum mobile separated and forced asunder; and they affirm a cosmical consent, as it were the common bond of the system. They affirm that a diurnal motion is found not in the sky or heavens, but in the air, in waters, even in what are placed on the superficies of the earth, as far as relates to their turning round. They affirm that that close following and cosmical rolling in fluids is their whirling tendency to become consistent, till at length they reach a state of perfect rest. They deny that the stars are fixed like knots in a board. They deny that eccentric circles, epicycles, and such like crafty devices are realities. They affirm that a magnetic motion, or one having a power to collect matter together, is in full vigour in the stars, by which fire elicits fire, and elevates it. They affirm that, in the firmament of the planets, the bodies of the planets move and revolve quicker than the rest of the heavens in which they are placed, which certainly revolves, but slower. They affirm from that inequality the waves, the undulations, the flowings and ebbings of the ethereal atmosphere of the planets; and from them that various motions are drawn forth. They affirm a necessity in the planets of revolving quicker or slower, according as they may be placed higher or lower in the heavens, and that from the consent of the universe. But at the same time they affirm the languor, resulting from an incitement in their course beyond what nature has prescribed, in the planets both of the greater and lesser orbit. They affirm the following after the sun, from the defective nature of weaker flames, of Venus and Mercury; since even the moving stars, the attendants of Jupiter, have been discovered by Galilæus. But these are matters of which we, standing as it were in the threshold

of natural history, and of philosophy, take a prospective view—subjects which, probably, the inquirer will be better qualified to prove, in proportion to the depth of his researches into natural history. But again, however, do we enter our protest against this fetter of intellect. In these, as in other matters, we are sure of the correctness of our career, though we be not so persuaded as to the station we are entitled to hold in it. But we have mentioned these topics during our intellectual journey lest any one should suppose, that from a wavering judgment, or a destitution of talent to maintain the position, we had a preference for advocating negative questions.

Wherefore we will retain, as the heavenly natures are wont to do (since our treatise is of them), a dignified constancy.

THOUGHTS AND OBSERVATIONS

OF

FRANCIS BACON, OF VERULAM,

CONCERNING THE INTERPRETATION OF NATURE, OR THE INVENTION OF THINGS AND OF WORKS.

FRANCIS BACON thought in this manner. The knowledge whereof mankind is now possessed does not extend to certainty and magnitude of works. Physicians pronounce many diseases incurable, and often make mistakes, and fail in the treatment of the rest. Alchymists wax old and die in the embraces of hope. The works of magicians are transitory and barren. The mechanical arts take but little light from philosophy, and do but spin on slowly the little threads of their own experience. Chance is, without doubt, a beneficial discoverer of inventions; but one that scatters her favours among men in distant ages and periods. So he saw well, that the inventions of man, which we possess, must be counted very imperfect and immature; and that, in the present state of the sciences, are not now to be expected, except in a great length of time; and that those which human industry has hitherto produced cannot be ascribed to philosophy.

He thought also, that in this narrowness of man's power, that is most deplorable at present, and ominous for the future; that men, contrary to their real interest, strive to rescue ignorance from shame, and to satisfy themselves in this poverty. For the physician, besides the cautels of practice (in which there are no small means of defending the credit of his art), calls in what is, as it were, a general cautel of art, by turning into a reproach upon nature the weakness of his art; and, what art does not reach, that he discharges from art upon nature, as an impossibility; neither can art be condemned, when itself judges. That philosophy also, out of which the knowledge of physic, which now is in use, is hewn, itself receives and cherishes certain positions and opinions, which, if they be well weighed, induce this persuasion, that nothing arduous or powerful in nature is to be expected from art, and the hand of man. Hence that opinion, that "the heat of the sun or star, and the heat of a fire differ in kind:" and that other,

that "composition is the work of man, but mixture is the work of nature alone" and the like; which, if they be carefully examined, all tend to an envious circumscription of human power, and a voluntary and artificial despair, which rejects not only the auguries of hope, but the chances of experiment, and cuts away all the incitements and nerves of industry; while they are solicitous, only, that their art be thought perfect, and labour for a most worthless vainglory; namely, to have it believed that all is impossible that is not already found. But the Alchymist, to relieve his art, throws the blame on his own errors, accusing himself, either of not fully understanding the terms of the art and its authors, which makes him attend to the whispers of tradition and oral evidence; or else of failing in the true proportions, and scruples, and moments of practice; which makes him renew infinitely his trials, under what he supposes more favourable prospects. And, meantime, when in the mazy labyrinth of experiment, he lights upon certain inventions, either new in appearance or of some utility, he feeds his mind with such foretastes, and displays and magnifies them above their value, and supplies the rest in hopes. The magician, when he finds something, as he conceives, above nature effected, and is convinced that a breach is once made in nature, gives his imagination wings, and scarcely allows that the matter admits of degrees of greater or less; wherefore he assures himself of arriving at the highest power; not seeing that they are but subjects of a certain and almost definite kind, wherein magic and superstition, in all ages and countries, have had power and played. The mechanical person, if he chances to add a higher finish or more elegant ornament to previous inventions, or to compound, and bring together into one, separate observations; or to couple things more commodiously and naturally with their use; or to produce the work in greater or less mass and volume than has usually been the case; ranks himself at length among inventors. So he saw well, that men came to sneer at the invention of new things and arts as a vain attempt, and not to be relied on; or to believe that important inventions are indeed extant, but confined among a few, in the strictest silence and mystery; or else that they descend to account those little industries and additions, inventions. All which turns to the averting of men's minds from just and constant labour, and from the working of inventions, noble and worthy of the human race.

He thought also, when men did set before themselves the variety and exquisite perfection of works supplied for human life by the mechanical arts; they are apt rather to admire the provisions of man, than to apprehend his want; not considering that the original observations of man and operations of nature, which are, as it were, the breath and life of all that variety, are not many nor deeply fetched; and that the rest belongs to man's patience, and the subtle and ruled motion of his hand or instruments; and that in this the shop is very like the library, which exhibits such a variety of books, in which, if one carefully examine, he will find nothing but infinite iterations of the same thing, varied in the form and mode of treatment, but preoccupied in invention. So he saw plainly, that opinion of abundance was one of the causes of want; and that both works and doctrines appear many, but are, when examined, few.

He thought also that those doctrines which we have, are presented with a kind of ambition and pretension, and come before us dressed up and in form, as if each art were in every branch perfect and finished. For it is reduced into such methods and divisions, as seem to embrace and include all treatises that can possibly bear on that subject. And however weakly the parts are filled, and destitute of any living seeds of things; yet they carry the show and reason of a total; and it is brought to this, that a few writings of some received authors, yet not the best chosen, go for the very art in its perfection. Whereas the earliest searches for truth in better faith, and with more fortunate event, used to throw into aphorisms or sentences short, scattered, and unconfined by method, the knowledge which it was their object to gather from the consideration of things, and to store up for use; which, as they showed simple representations of things discovered, and evident spaces and vacancies for things not discovered, were less fallacious; and invited men's talents and thoughts alike to criticism and invention. But now sciences are exhibited in such forms, as to claim belief, not solicit judgment, and check with a sullen authority the generous springings of invention: so that every succession and devolution of philosophy bears the character of master and disciple, not of inventor and continuer; whence it necessarily follows that sciences continue in their own steps, and never stir from their ground. This has been done for many ages, so that what is positive is fixed, and that which is question is kept question, and remains wholly in the same state. And, therefore, he saw

plainly, that columns against proceeding further are firmly and, as it were, fatally pitched; and that it is no marvel, that that is not obtained, for which men feel neither hope nor desire.

He thought also, that what is said of men's despondency or self-conceit, as far as concerns most of the pursuers of science, is too deeply fetched, for far the greater part is otherwise occupied. They seek knowledge either for delight and satisfaction, or for profit and professional emolument, or for support and ornament of the reputation: and if these are proposed as the ends of sciences, so far will men be from wishing that the mass of knowledge receive an increase, that, in that stock which is at hand, they will seek no more than what they can turn to use in the matter before them. And if any one among so many seeks knowledge with an honest zeal and for its own sake, yet he will be found to hunt rather after variety than truth. And if he be a severer inquisitor of truth, yet that very truth will be such as will rather explain more subtly things already uttered, than kindle any new light. And if his heart is so large, that he propounds to himself further discovery, he will doubtless be most taken with that light which displays in the distance specious contemplations, not that which shows important works and inventions close at hand. So he saw plainly that we return to this point, that it is by no means wonderful that the course is not finished, when men turn aside to these lesser matters: and much more when, as far as he can see, the mark itself has never been set up and fixed for any man. But the mark is no other, than that mankind be continually enriched with new works and powers.

He thought also, that among these difficulties of the sciences, the case of natural philosophy has been the hardest of all: inasmuch as it has had but a trifling share of men's labour, has been readily deserted, and never cultivated and matured in any high degree. For since the Christian faith has grown up and been received, the greatest number of wits have been employed upon divinity, and in this subject the highest rewards have been offered to men's studies, and aids of every kind most plentifully supplied. And before-time, likewise, the greatest part of the labours of philosophers was consumed in moral philosophy, which was almost in the place of divinity to the heathens. And in both times a great part of the best wits betook themselves to public business, especially in the time

of the greatness of the Romans, who by reason of their large empire needed the service of the most. But the time among the Grecians, in which natural philosophy seemed most to flourish, was but a short space, and that also abused and thrown away in disputing, and affecting new opinions. But from that time to this, no one can be named, who has made it his business to cultivate natural philosophy, and consumed his life in its pursuit; so that this science has not for ages possessed any whole man, unless perchance one may instance some monk studying in a cloister, or some gentleman in the country, and that will be found very rare. But it has become a kind of passage and bridge to other arts, and this venerable mother of the sciences is turned into their handmaid, and made to serve physic and practical mathematics, or to season a little, young and unripe wits, like a kind of priming, that they may take a second wash in a kindlier and better manner. So he saw plainly, that, from the small number, and hurry, and rawness of its followers, natural philosophy is left destitute. And soon after, he saw also that this had a very great influence on the general state of knowledge: for all the arts and sciences, when torn up from this root, may perhaps be polished and moulded to use, but will grow no further.

He thought also, how prejudicial and every way hard an adversary natural philosophy has in superstition and the immoderate and blind zeal of religion. For he found that some of the Grecians who first propounded the natural causes of thunder and storm, to men unused to such speculations, were condemned, on that ground, for impiety: and that the cosmographers, who, by most certain proofs, which no man in his senses would now dispute, asserted the spherical figure of the earth, and consequently the existence of Antipodes; were not much better treated, but included in the same sentence, not indeed affecting life, but character, on the accusation of some of the ancient fathers of the Christian church. And the case of natural history is now much worse, in regard of the boldness of the schoolmen and their dependencies, who having, as far as they can, reduced divinity into method, and given it the form of an art; have attempted moreover to incorporate the contentions and turbulent philosophy of Aristotle into the body of their religion. And it has the same tendency that, in our time, no opinions or arguments are found to have more success, than those which celebrate with great pomp and

solemnity the union, as if it were a lawful one, between divinity and philosophy, that is faith and sense; and while they tickle men's minds with an agreeable variety, are meantime making an unhallowed conjunction of divine and human matters. And, truly, if one observes carefully, as great danger threatens natural philosophy from this kind of hollow and ill assorted league, as from avowed hostility. For, in a treaty and confederation of this nature, only the received maxims of philosophy are included; but every thing of advancement or improvement is most rigorously and obstinately shut out. In fine, with respect to augmentations, and what may be called the new shores and tracts of philosophy, all from the side of religion is full of grovelling suspicion, and impotent disdain. Thus some in their simplicity fear that any deeper inquisition into nature may penetrate perchance beyond the allowed and sanctioned limit of sobriety, improperly applying what is said of the secrets of God, many of which remain closed under the divine signet, to the secrets of nature which are guarded by no interdict. Others, with greater cunning, conceive that if men are ignorant of second causes, each particular may be more easily referred to the wand of the deity, which they think is of the highest interest to religion; though this is no other than seeking to flatter God with a lie. Others tremble for the precedent, lest the shifting and changes of philosophy end with attacking religion. Others, lastly, seem in fear that, in the inquisition of nature, something may be found to shake religion. Both which opinions savour of a sort of incredulity and worldly policy, but the last cannot even be brought into doubt or question without impiety! From which it was sufficiently clear, that in opinions of this kind there is much weakness, and not a little envy and bitterness. For natural philosophy is, next to the divine word, the most certain remedy of superstition, and the most wholesome food of faith; and is, therefore, rightly considered the truest and loveliest handmaid of religion; the one displaying the will of God, the other his power. So that he was not wrong who said: "Ye do err, not knowing the Scriptures, nor the power of God," joining in an intimate union, information of his will, and meditation on his power. But, though this is most certain, it still remains among the most effectual hindrances to natural philosophy, that all which is pronounced by blind zeal and superstition is considered out of the reach of dispute.

He thought also, that, in the orders and customs of

schools, colleges, and such conventual bodies, all is found to be adverse to the further progress of the sciences. For much the greater part are professors, and in the receipt of emoluments. And the lectures and exercises are so arranged that nothing out of the common routine can easily arise in any one's mind. But if a man chance to use the liberty of inquiry and judgment, he will soon find himself left in a great solitude. And if ever he can bear this, he will yet find that, in achieving his fortune, this industry and magnanimity will be much hindrance to him. For in places of this kind men's studies are almost confined to the writings of certain authors; from which, if any one disagrees, or propounds matter of argument, he is immediately set down as a turbulent person and an innovator. Though, if one judge fairly, there is a great difference between the government of civil affairs and the arts; for the danger is not alike of new light, and of new notion. It is true that in civil affairs change, though for the better, is suspected from fear of disorder; since governments rest on authority, consent, credit, opinion, not on demonstration and truth in abstract. But in the arts and sciences, as in mines, all sides should resound with new works and further progress. And it is so in right reason. But in real life, he saw that the government and administration of the knowledge, which is in use, presses cruelly, and checks the increase and growth of science.

He thought also, that, even in the opinion and common feeling of men, much appears on all sides that denies a fair opening to the increase of knowledge. For most men, unjust to the present times, hang upon antiquity, and believe that if we, who now live had had the office of first attempting what was sought for and discovered by the ancients, we should not have come up to their works by a great space. And in like manner they believe that if a man even now, relying upon his own powers, attempt to begin anew an inquisition, the end will be, that he will either come to the very conclusion that was approved of by antiquity; or else to some one, which, having been long ago decided upon and rejected by antiquity, deservedly fell into oblivion. Others, altogether slighting the powers of human nature at both periods, ancient and modern, fall into a fanciful and superstitious belief that the elements of the sciences emanated from spiritual beings, and that new inventions in the same manner may receive assistance from their authority and concurrence. Others of more sober and chastened

imagination, but greater diffidence, openly despair of any increase of knowledge, from reflecting on the obscurity of nature, the shortness of life, the uncertainty of the senses, the weakness of the judgment, and the difficulties and unbounded variety of experiments. So that such swelling hopes, as promise more than we now have, are the offspring of a weak and unripened mind, and will no doubt have their beginning in exultation, their middle course in difficulty, and their end in confusion; and there is as little hope of the reward as of the accomplishment; for knowledges evidently breed and expand in great and excellent wits, but the estimation and price of them is in the multitude, or in the inclinations of princes and great persons meanly learned. So that the projection of sciences and the judgment upon them are not in the same; whence it comes that those inventions only succeed which are accommodated to popular reason and common sense; as happened in the case of Democritus' theory of atoms, which being a little too remote was treated with ridicule. Hence sublime views of nature, which, almost like religion, must enter the senses of men with difficulty, may be now and then conceived, but (unless proved and recommended by evident and exceeding utility, which hitherto has not been the case) are generally in a short time blown and extinguished by the winds of common opinions; so that time, like a river, is wont to bring down to us what is light and blown up, while it sinks and drowns that which is solid and grave. So he saw well that the hindrances of an improved state of the sciences were, not only external and adventitious, but innate also and drawn from our very senses.

Moreover, he thought that the vagueness and irregular form of words mocks the understanding and, as it were, attacks it; for words are like coins which represent the image and authority of the people; for they always compound and classify according to popular notions and acceptation which are for the most part erroneous and very confused; so that even infants in learning to speak, are compelled to suck in and swallow a pernicious system of error. And though the wise and learned endeavour by various contrivances to deliver themselves from this bondage, by making new words which is harsh, and by inserting definitions which is troublesome, they cannot, with all their strength, throw off the yoke; so that innumerable controversies, even in the most acute discussions, are raised about words, and, what is much worse, that depraved

coinage of words reflects its rays and impressions into the mind itself, and is thus not only a hindrance in discourse, but injurious also to the judgment and understanding. So he saw well, that, among the internal causes of error, he must place this as one serious and pernicious import.

He thought also that, beside the usual difficulties of the sciences and knowledge, natural philosophy, particularly the active and operative, had its peculiar drawbacks and impediments. For it has been notably hurt and discredited by some of its professors, light and vain men, who, partly from credulity, partly from craft, have loaded the human race with promises, offering prolongation of life, delay of infirmity, relief from pain, supply of natural defects, deceptions of the senses, the binding or inciting of the affections, illuminations of the mental powers, ecstacies, transmuting of substances, unlimited multiplication of motions, impressions on the air and changes of it, divination of future events, representations of distant occurrences, revelation of mysteries, and many other things. Now, in considering these liberal givers, we shall not be far wrong if we pass a judgment like this: that there is as much difference in philosophy, between their triflings and the true arts, as there is in history between the wars of Julius Cæsar or Alexander, and those of Amadis de Gaul or Arthur of Britain. For it is evident that those renowned generals achieved more in reality than the other shadowy heroes are pretended to have done, but by means and ways of action not at all fabulous or supernatural. So that it is not just to deny credit to true history, because it is sometimes wounded and injured by fabulous stories. For Ixion of a cloud begat the Centaurs, yet still, of the real Juno, Jove begat Hebe and Vulcan, that is the lovely and divine virtues of nature and art. But though this is true, and it shows great ignorance to be incredulous without distinction; yet he saw well that the access to truth was formerly shut up, or at least narrowed by fables of this kind, and that the ignominy of vanity even now abates all greatness of mind.

He thought also that there is found in the mind of man a certain affection, naturally bred and fortified by some men's opinion and doctrine, which has checked and prevented the true proceeding of natural philosophy, that is the active and operative kind. This is a rotten and pernicious idea or estimation, that the majesty of man's mind suffers diminution if it be long and deeply conversant with experiences and particulars subject to sense, and bound in

matter: especially as such things usually appear laborious to search, ignoble to meditate, harsh to deliver, illiberal to practise, infinite in number, and contemptible in their minuteness; and, though such qualities as these no ways accommodate to the glory of the arts. And this opinion or state of mind received much strength from another wild and unfounded opinion, which held that truth is innate in the mind of man, and not introduced from without, and that the senses rather excite than inform the understanding. Neither has this error, and (to describe it truly) delusion of mind, been any ways corrected by those who have given to sense the due, that is, the first place. Nay more, even these by their example and practice, deserting altogether natural history and actual experience, rested only upon agitation of wit, and grovelled without ceasing among the darkest idols of the understanding, under the specious name of contemplation and reason. So he saw well that this rejection and divorce of particulars has thrown the human family into total disorder.

He thought also, that we should not make our conjecture from the hindrances we meet with; only, since it is possible that the fortune of mankind may overcome these difficulties and burst the barriers. Hence we must consider and examine closely the nature of that philosophy which is received, and whatever other, from ancient times, has been cast upon our shores, like the spars of a sunken vessel. And he found that the natural philosophy which we have from the Greeks is to be accounted a kind of childhood of science; and that its properties are those which belong to boys, that is, it is forward to chatter, but immature and unqualified for generation.

Aristotle, by common consent the chief of that philosophy, without ever meddling with the observation of nature, has been unprofitably employed on stale opinions, and on their comparison, opposition, and reduction. Nor is it reasonable to hope for any thing solid from one who has made up the world itself of categories. For it is of little concern whether we lay down that matter, form and privation, or substance, quality, and relation, are the real principles: but we had best pass by those controversies; for it would be inconsistent to set about a formal confutation, when we neither agree about the principles, nor the modes of demonstration; and again, to lash with ridicule one who has obtained an authority almost dictatorial in philosophy, would have more levity than suits the dignity of the subject, and be moreover arrogant. He has

certainly corrupted natural philosophy with logical subtleties, which were his own creation, as he himself too loudly boasts.

But to leave him, Plato was, without doubt, a man of loftier genius, and one who aimed also at the knowledge of forms, and used induction universally, not for principles only; but with reasoning futile on both sides, since he pursued and accepted vague inductions and abstract forms. And if we consider with attention the writings and habits of this philosopher, we shall find that he took no great interest in natural philosophy, at least so far only as to vindicate his own name and character as a philosopher, or give by its intermixture a certain majesty to his moral and political doctrines. And he adulterated nature as much with theology, as Aristotle with logic; and, to say the truth, approached as near to the province of the poet as the other to that of the sophist. Now we can draw the doctrines of these two from the very fountain head, their works having survived.

There is a different estimate to be made of the rest, namely, Pythagoras, Empedocles, Heraclitus, Anaxagoras, Democritus, Parmenis, Zenophanes, and others; because we have received their opinions by means of intermediate writers only, and by tradition, and scattered fragments; so that we must use closer inquisition, with greater scruple of judgment, to make up for the disadvantage of their circumstances. But yet he has been most diligent and watchful to catch every whisper about these opinions, so as to extract whatever can be found referring to them, where they are confuted by Aristotle, or cited by Plato or Cicero; or in Plutarch's budget, or Laertius' lives, or Lucretius' poem; or any other scattered hint or mention: and he has examined them with impartiality and careful judgment. And, first, there is no doubt that, if their opinions were in their own works, they would have greater weight; for the strength of theories lies in a nice and mutual harmony of the parts, and a certain unbroken demonstration; and they are therefore weakened when uttered in fragments: wherefore he did not make his judgment of them lightly.

He found also, among so many opinions, a number of remarks made with some care with regard to the observation of nature, and the assigning of causes: and, as commonly happens, some have been more successful than others in different branches. The discoveries and opinions of Pythagoras alone (though his doctrine of num-

bers imply something physical) are mostly of that kind, which lead rather to the founding of some religious order, than to the opening of a school in philosophy; which the event proved: for this philosophy had more weight in the heresy of the Manichæans, and the superstition of Mahomet, than among men of science. The rest however were certainly natural philosophers; and there are some of them who have dived into nature much deeper and more acutely than Aristotle. But he busied himself, like the Ottomans, in destroying his brothers; and succeeded in it to his wish. Now he had the same opinion of Aristotle as of the other Greek philosophers, namely, that such systems and theories were, like the different arguments of dramatic pieces, moulded into a certain keeping with nature, some with more nicety, others more negligently and roughly; and that, as belongs to fiction, they appeared more trim and symmetrical than real accounts. Nor could the wanderings and searchings of the human mind rest or limit themselves in those theories which were uttered and published. For, had not the customs and affections of men, and the pursuits of business, been adverse and blighting to novelties of this kind, even in matters of contemplation, many other sects would doubtless have been formed in natural philosophy. For, as it is in astronomy with those who decide that the earth moves in a circle, and those who explain it by elliptical and epicyclic motion, that their systems to account for appearances in the heavens, are alike pleadings for a side, and amount not to conviction, nay, even the calculations of the tables answer with each: in the same way it would be much easier to devise various theories in natural philosophy, all widely differing with one another, and yet each consistent with itself, and using unfairly the suffrage of popular zeal, which in questions of this kind often guides the judgment, and drawing it over to opposite sides.

There has indeed been no want of men who in this age and the last have meditated new systems of natural philosophy. For within our recollection Telesio has appeared on the stage, and exhibited a new plot, not so well rewarded with applause, as the probability of its arguments merited: and Fracastoro, not long since, though he did not set up a new sect, yet was staunch in using liberty of judgment and inquiry: Cardan too was as bold but less steady. Very lately also, our countryman Gilbert, after most laboriously examining the nature of the magnet with great sagacity and perseverance, and with a host and

almost a multitude of experiments, began forthwith to design a new school in natural philosophy; and was not terrified by the ridiculed name of Zenophanes, whose opinion he inclined to. These then, and all who are or shall be like them, must be ranked in the band of ancients, for there is the same character in them all: thus they were men who gave their opinions on few matters, and trifled with nature without making such a close union with her as to beget either certainty of contemplation or useful works.

It is a truth that out of so many schools of philosophy, laboriously cultivated through such a length of years, not one experiment can be cited, which has a view to the improvement or aggrandizement of the state of man, and can be pointed to with truth as the gifts of such speculations. On the contrary, indeed, Aristotle's device of the four elements, which he rather gave currency to than invented (and which being greedily caught up by physicians, drew after it the systems of the four complexions, the four humours, and the four primary qualities), like some malignant and unlucky star, caused extraordinary barrenness in medicine, besides many mechanical arts; men all the while allowing themselves to be satisfied with conceits and methodized nothings of this kind, and carry no further. Meantime a multitude of questions and controversies clamoured and fluttered on all sides round these philosophies, so that they seem represented to the life in the fable of Scylla, who had the upper part and countenance of a virgin, while her womb was girt and crowded with barking monsters. In like manner have those doctrines something specious at first sight, but when we approach the generative part, to produce fruits, nothing is to be found but strife and restless disputing, which are in the room of bearing.

At the same time it must be remembered, that the reasons for rejecting these systems assail the opinions only, not the understandings or industry of their authors. For, in proportion to a man's wit and zeal, does he, if he desert the light and observation of nature and the evidence of particulars, plunge himself and become involved in the darkest and most intricate recesses, and, as it were, dens of phantasies and idols. Again, the general plans of the philosophies are not attached with the purpose of approving the detailed application of minor causes, which are commonly given and inquired into in the works of philosophers of this kind: on the contrary, these are no better than the other, not only because they depend upon them, but also because they display no severity of inquisition, and lead us

to matters not unknown, but almost at our feet, in which the mind acquiesces lightly, and is satisfied, but by no means penetrating into the interior of nature. And they have always this fault, which is alike in all, that they connect together experiments and known effects in a kind of system, and, as it were, with a net, made to the just measure of what is known; but never exhibit any cause or canon, which may mark out new and formerly unknown effects and experiments.

Having thus traversed these outskirts of philosophy, casting his eyes on every side, he turned them to the depths of antiquity, as to a kind of clouded and dim region. And he saw that if he chose to deal unfairly, there would be no difficulty in persuading men, that with the ancient sages, long before the Grecian times, natural science flourished with greater vigour, but perhaps in greater silence: and that it were, therefore, more dignified to refer to them those discoveries which are now made: as new men are used to do, who connect with themselves the nobility of some ancient stem by the rumours of genealogy and conjecture. But, relying on the evidence of facts, he rejected every form of imposture; and, whatever might be his opinion about those times, thought that it had no more relation to the matter in hand whether our discoveries were known to the ancients, and in the revolution of things have sunk and risen again; than it should be any concern, whether the New World be that island Atlantis, and so known to the ancients, or was first discovered by us. For inventions are to be sought in the light of nature, not traced in the shades of antiquity. Meanwhile some may remark that he has passed over the art or philosophy of chymistry; which he has done from respect, being unwilling to class it with those philosophies which are entirely barren of works, since it has displayed and given many noble discoveries. Indeed this art accords with the fable of the old man, who bequeathed his sons a treasure buried in his vineyard without showing them where, whereby they set themselves with diligence to dig the vineyard, and did not find the treasure, but, by their husbandry, the vintage was made more abundant. In like manner the sons of chymistry, while they are busy seeking the hidden gold, whether real or not, have by turning over and trying, brought much profit and convenience to mankind. Yet their inventions issued in no other or better way than the birth and advancement of mechanical arts, that is by mere experience. For their philosophy and speculation are unsound, and harsher than those

fabulous philosophies of which we have been speaking. For though the three principles was no useless discovery, but partly bordering on fact: yet, for the most part, practised in a few experiments of distillation, they referred every thing in philosophy to separation and liberation, unmindful of true alteration. But the structure of that opinion, on which as a foundation their philosophy rests, that there are four matrices or elements in which the seeds and forms of matter complete their fruits, and that these are quadriform according to the different elements, so that nothing is found in sky, air, water, or earth, which has not in the three remaining ones something parallel and corresponding: this fantastic arrangement of matter will certainly scarce have a place in the dreams of the skilful observer of nature. Not unlike this are the harmonies of things believed in by the followers of natural magic, who explain every thing by sympathy and antipathy, and, by the most idle and unfounded conjectures, affix to things miraculous virtues and powers. Yet he treats them gently, because among so many fables they have yet produced some works, though commonly of that kind which are rather novel and surprising than fit for profit and utility. But even novelty has often the advantage of agitating somewhat the intricate folds of nature, and assisting with light at least, if not with deed. So he saw that, neither in the opinions of the Greeks or the moderns, nor in the traditions of alchymy or natural magic, could any thing be found leading to the increase of human means. Wherefore all these should either be thrown into oblivion, or given up to the pursuit of the multitude, while the true sons of knowledge turn their course elsewhere.

He thought also that the modes of demonstration should be reviewed; for demonstrations, by a certain influence are philosophy; and, in proportion as they are just or faulty, complete or imperfect, doctrines will probably ensue from them. But he found that the demonstrations which are in use are neither full nor certain. Yet we should not blame the senses, as some have done. For the errors of the senses in particulars have no great effect on the sum of the sciences; not more at least than may be corrected by the rightly informed mind. But that the mind itself, if it rely on nature without art and discipline, is unequal to the matter and below it, may be pronounced boldly. For it is neither so capacious as to admit and arrange the infinite variety of particulars necessary for information, nor so free and un-

biassed as to receive true and natural impressions without some warp and colouring. Nay, it is very certain both that the human mind is generally like an uneven mirror, which receives and reflects the rays of objects according to the angle of each facet, and not on a plain surface; and also that every one, from his education, pursuits, and constitution, is haunted with a kind of misleading power, and, as it were, familiar spirit, which mocks and disturbs the mind with various and fantastic devices. Yet we must not, therefore, fall into the opinion of incapability. For it is evident, that by no steadiness of hand or skill of eye, however exquisite, could an exact straight line or circle be described; yet, on applying a ruler or turning the compasses, the matter is easy. Again, in mechanical crafts the naked hand of man can work but little, yet with the aid and means of instruments it conquers alike the vastest and most minute. It follows then that we must fly to art, and must look to demonstration, which is governed by art. And sentence may be given in a few words on the syllogism which is Aristotle's oracle. It is, doubtless, a useful instrument and aid to the understanding in sciences, which are founded in human opinion, as the moral and political; but inferior and incompetent to the subtlety and obscurity of natural processes. For the syllogism certainly consists of propositions and the proposition of words, and words are the evidences and signs of ideas or conceptions of the mind. So that if the ideas themselves, which are the souls of words, are vague, incomplete, and not sufficiently defined (which is for the most part the case in nature), the whole sinks. Induction remains the last and only refuge and aid for matter; nor are our hopes placed in it undeservedly, since it can collect laborious works, and the certain evidence of facts, and lay them before the mind. But its name only is known, its power and use has hitherto lain hid. For induction must be judged of thus; in its use and form men have erred doubly. First, that impatient of delay and searching round for short cuts, and hastening to fix some things as certain, round which as poles discussions might turn, they have only applied it to the general principles of sciences, lightly hoping to work all within by syllogistic deduction. Secondly, that having examined the syllogism accurately, but this demonstration hastily and carelessly, they have devised its form very simple and indeed puerile, to proceed by enumeration alone, and thus conclude precariously, not necessarily. No one, therefore, can wonder if he, with this opinion on de-

monstrations, does not agree on natural philosophy with others, either ancient or modern. For it cannot be (to speak jestingly), that the drinkers of water and wine should feel alike. For they swallow a raw fluid, either flowing spontaneously from the mind or pumped up with some labour; but he drinks a liquor prepared from innumerable grapes mature and in season, plucked and heaped up in bunches, afterwards squeezed in the winepress, purified in the vat, and clarified; which will bear time, and at the same time is corrected of all intoxicating quality, by neither giving nor leaving any room for the vapours of the fancy. So he saw that the philosophies of which we have spoken should be rejected, not only for their barrenness of works, but for the weakness and fallaciousness of their demonstrations also, since they are not only removed from nature, but deserted and betrayed by the very auxiliaries they have raised.

He thought also, that we should make a separate review of the modes of invention in use, if there be any. But in this quarter not so much misleading and devious paths, as solitude and vacancy, are found, which strike the mind with a kind of stupor. It has not been the object or desire of any man to guide the force of human wit and understanding to the invention and improvement of arts and sciences, and hew a road thither; but the whole has been and is left to the dimness of tradition, the steps and fury of arguments, or the waves and turnings of chance and experiment. Hence, it was not without reason, that, in the temples of the Egyptians, who (as was the custom of antiquity) used to deify inventors, so many images of brutes were found; since animals without the light of reason have been, almost as much as men, the discoverers of nature's operations, nor have men in this matter made much use of their prerogative. We must however examine what is done. And first of the simple and untaught mode of invention which is common with men, it is no other than that he who girds and prepares himself for an invention, first inquires and learns what others have said on the subject, then adds his own reflection. But for a man to commit himself to the guidance of others, or to intreat and almost invoke his own spirit to give him oracles, is a proceeding without ground. Next follows the invention in use with logicians, which has only a nominal connexion with the matter in hand. For it is not of principles and axioms, of which arts consist, but only of what seems

agreeable to them. For logic, with a well known response, drives the curious and importunate, and lovers of business to yield their faith, and as it were allegiance to some art. There remains simple experience which, if unforeseen, is called chance, if sought, experiment. And this is no more than, as they say, the faggot unbound. Nay more, they who are assiduously employed in opening and bringing to light some nature or work, by a long and desultory course of experiments, are either fixed in amazement, or run round in giddiness, sometimes eager, at others confused; and always find matter for further inquiry. Nor can it well be otherwise. For it is an aimless and very foolish speculation, to search for the nature of a thing in itself: for the same nature is hidden in some, in others open, and as it were palpable; and causes admiration in the latter, in the former not even attention. Thus that quality of bodies which resists separation, seems a very subtle thing, and ingenious in bubbles of water, which for this purpose throw themselves into thin films in the form of a hemisphere. The same quality is little marked in stone or wood, but goes under the name of solid. Wherefore he saw that a certain ill fortune rather than ignorance is to be imputed to men, since they have been drawn from the appointed path by mischance or temptations, but, within its bounds, have not shown themselves wanting in energy.

He thought also, that some limit must be set to despondency, or at least to complaint: and that it must rather be considered whether we are to stop altogether, and use what we have already; or to make trial and devise something by which the matter may proceed better. And first, it is right to mark the excellency and value of the end and purpose, that in a dry matter and difficult attempt there may be a greater supply of industry. And he remembered that in ancient times, the affection and zeal of men exceeding moderation, divine honours were paid to inventors. But those who had deserved well in civil affairs, as the founders of cities and empires, legislators, deliverers of their countries from long standing evils, dethroners of tyrants, and the like, reached not beyond the rank of heroes. Nor has this distinction in old time been made without reason, seeing that the gifts of the former fell upon the whole human race, those of the latter upon limited districts and patches of society: the former too pour blessings on human life without violence or uproar, while the latter are not commonly introduced but with struggle and

tumult. Now if the utility of any single invention so moved men, that they accounted more than man him who could include the whole human race in some solitary benefit, that invention is certainly much more exalted, which by a kind of mastery contains within itself all particular inventions, and delivers the mind from bondage, and opens it a road, that under sure and unerring guidance it may penetrate to whatever can be of novelty and further advancement. For as in the early ages, when sailors steered their course only by observations of the heavenly bodies, they coasted along the shores of the old continent, or ventured across some small internal seas: but it was necessary that the use of the compass should be known, as a more certain guide of the passage, before the ocean could be crossed and the tracts of the new world discovered: in like manner, all that has been hitherto invented in human arts and sciences might have been found out by instinct, experience, observation, meditation, being more obvious to sense: but before we may stretch across to the more distant and secret regions of nature, it is a necessary provision, that some better and more perfect application and management of the human mind be found out. Wherefore such an invention as this would be, without doubt, a most noble and truly masculine offspring of time.

Again in the Holy Scripture he saw that Solomon the king, while in the pride of his power, his riches, his magnificent works, his guards, his household, his exact distribution and arrangement of slaves and domestics, his fleet moreover, the renown of his name, and the greatest honour from men: thought none of these his true glory, but said, that "the glory of God is to conceal a thing, but the glory of the king is to find it out," as if the divine nature took delight in the innocent and playful sport of children, who hide themselves that they may be found out; and from his indulgence and graciousness to men, chose the human soul his playfellow. And the glory of inventions is that they raise human nature, without hurting any one (as civil affairs commonly do), and do not press or sting a man's conscience, but bestow on all rewards and blessings without the sacrifice, or injury, or sorrow of one. For the nature of light is pure and harmless, it may be perverted in its use, but not polluted in itself.

Again, taking note of the purposes and ambitions of men, he observed three kinds of ambition, if it be allowed to give that name to one of them: the first is of those who struggle

fiercely to increase their sway in their own country; and this is common and mean. The second of those who strive to extend the sway of their country over other nations; which has doubtless more dignity, but not less selfishness. The third is of those who essay to create and extend the sway and empire of man himself or the human race over the universe of matter; which is clearly wiser and nobler than the others. Now the empire of man consists in knowledge alone, for his power is what he knows, nor can any force burst the chain of natural causes; for nature is only to be conquered by obeying.

He thought also and inquired what account should be made of the value and efficacy of inventions, whether simple and unmixed, or joined with their favours and benefits. And in no case is this consideration more plainly suggested, than in those three inventions, which were unknown to the ancients, and whose birth among us was obscure and noiseless; printing, gunpowder, and the compass. For these three, though a small number, and not remote in invention, have changed the face of things, and the condition of the world: the first in literature, the second in war, the third in navigation: and hence have flowed infinite mutations in the state of things, apparent to careful observers; so that no empire, sect, or star, seems to have had a stronger influence, and, as it were, ascendant over human affairs than those mechanical works. As to their worth, it may be best descried if any one will reflect what a gulf there is between man's life in the most polished country of Europe, and the rudest and most savage region of the New Indies: so great, that man may fairly be said to be a god to man, not only by reason of assistance and benefit, but from comparing their conditions. And this is not the effect of soil, or climate, or constitution, but of arts. But the new world of science and the new world of geography do not agree in the old being more refined than the new: on the contrary it is certain that the additions to arts must show themselves greatly superior to those we have, so as not only to bend nature gently, but to conquer and enslave it, and shake it to its foundation: for it almost always happens that what is easy of discovery is infirm of work; since the roots of things of potent virtue are covered deeply. But if to any one given to the love and worship of contemplation, this frequent and honourable mention of works sounds somewhat harsh and offensive, let him be assured that he thwarts his natural wishes; for in nature works are not

only benefits to life, but pledges of truth. And, as it is most justly required in religion that a man should show his faith by works, it is right also in natural philosophy that knowledge should be proved by its works in like manner. For truth is rather shown and proved by the evidence of works than by argument, or even sense. Hence there is one and the same means of improving man's condition and his mind. So he saw that what has been said of the dignity of the end we aim at and design, is not strengthened, but really diminished by words.

He thought also, that what has been said of the excellence of the end may appear accommodated to his wishes. We must therefore inquire carefully what hope shines on us, and on what side it appears: and we must be on our guard that love of what is excellent and beautiful do not make us lose or relax the rigour of our judgment. For it is meet to bestow on this matter legal caution, which distrusts on principle, and takes the least favourable view of human concerns. The lighter whisperings of hope must therefore be rejected, but those which seem to have some stability, discussed. And in taking a view of his prospects, it occurred to him, first, that what we are treating of, by reason of the eminent nature of good, is manifestly from God; and that in the works of God the smallest beginnings lead to their end. He had hope also from the nature of time: for truth is by universal consent the daughter of time. It is a mark therefore of utter weakness and narrowness of mind to attribute infinite effects to authors, but to withhold its due from Time, the author of authors and of all authority. Nor had he hope only in the common right of time, but also in the superiority of our own age. For the opinion of antiquity which men hold is a hasty one, and not even agreeing with the name. For the old age or more advanced period of the world is properly to be called antiquity. And in truth, as we expect a greater acquaintance with affairs and more mature judgment, in an old man than in a youth, by reason of his experience, and his having seen and heard and thought more; it is reasonable that in like manner we should hope from our own age (if it knew its own strength, and would essay and apply it) more than from former times, being a more advanced age of the world, and enriched to fulness with numberless experiments and observations. Nor must we think it little that, in those distant voyages and travels which have been frequent in our time, much has been dis-

covered in nature which is capable of shedding new light on philosophy. Nay, it is dishonourable to men, if in our age the regions of the material world, that is, the earth, the ocean, and the heavenly bodies, are discovered and displayed to a vast extent, but the boundaries of the intellectual world are still fixed within the narrow space and knowledge of the ancients. Even the state of Europe at present in a political respect is not averse. England is raised, France at peace, Spain worn out, Italy and Germany in a state of inaction: so that from the power of the greatest kings being balanced, and the condition of the first rate nations shaken, affairs lean to peace, which is like clear and mild weather for the sciences. Nor is the present state of letters itself unfavourable; nay, it enjoys a certain facility both from the art of printing unknown to ancient times, by means of which the inventions and thoughts of individuals glance from side to side like lightning: and also by reason of religious controversies, from weariness of which perchance men have been able to turn their minds more readily to the contemplation of the power, the wisdom, and the goodness of God in his works. But if any one is moved by the consent and continuance enjoyed by the opinions of the ancients, he will find if he looks more carefully into the matter very few leaders, and the rest followers only and a crowd; men, that is to say, who have stepped from ignorance into prejudice, and have never met in true consent, which must be after the use of judgment. And on proper reflection, the length of time itself shrinks into a narrow shred. For of the five and twenty centuries with which the memory of man is acquainted, scarce five can be marked out which have been useful and productive in the increase of knowledge, and even they have been for the most part planted and cultivated with other knowledges, and not that of nature. For there are reckoned three periods and revolutions of opinions, one with the Greeks, another with the Romans, the last with the western nations of Europe; the remaining time of the world has been taken up with wars and other pursuits, and, as far as regards the growth of knowledge, is a barren wilderness.

He thought thus then about time. From the power and nature of chance also he augured thus. Chance indeed has been, without doubt, the author of many inventions, occasion being taken from the nature of things. Did then the Promethens of New India differ from the European

in the discovery of fire, because the former have no supply of flints? In those things, therefore, which are at hand chance gives inventions in plenty; in those which are removed from common use, she travails and brings forth more sparingly, but yet in all ages. For no cause can be seen why chance should be thought to have grown old and past the time of bearing. He thought, therefore, that if many discoveries chance to men without seeking, and while otherwise employed, no one can doubt that if the same men were to search, and by rule and order, not by fits and starts, many more things must be discovered. For though it may happen in one or two cases that some one may by chance hit upon what has escaped him before when straining all his powers in the inquiry, yet, without doubt, the contrary will appear in the long run. For chance works thinly, and slowly, and irregularly; but art constantly, and rapidly, and connectedly. From those inventions also, which are already brought to light, he thought it might be truly conjectured about those which are yet hidden. But some of them are of that kind that, before their discovery, surmises of them would not readily come into any one's mind. For men commonly guess at new things by a likeness to old ones, and by ideas learned of them, which is a very vain way of thinking, since those things that are sought from the fountain-head do not flow through the common channels. Thus, if some one, before the invention of fire-arms, had described them by their effects, and had said that a discovery was just made by means of which walls and the strongest fortifications might be battered and beaten down from a great distance, men would certainly reason much and variously about multiplying the powers of casting engines and machinery, by weights, wheels, and the like; but the idea of a fiery wind could scarcely occur, as what they had never seen an instance of, except perchance in an earthquake or thunderstorm which they had neglected as not imitable. In like manner if, before the invention of silken thread, some one had spoken thus: that there was a certain kind of thread useful for dress and furniture, which much excelled linen and woollen thread in fineness and, notwithstanding, strength, and moreover gloss and softness; men would immediately begin to think of some vegetable silk, or the delicate part of some animal's hair, or the feathers and down of birds, but would never guess the fabric of a worm, and that too in such plenty and every year. And if any one had dropped a hint about worms, he would certainly have been ridiculed for

dreaming of some new works of spiders. And hence, for the most part, those things which are still hidden in the womb of nature have this same property that they escape and elude the imaginations and reasonings of men. So he thought if it check any one's hope of new inventions, that, by inference from those before us, he counts them either impossible or unlikely, he should know that he is not competent, even to wish fitly and usefully.

But again he thought that there are other things among those discovered of a different and almost contrary nature which lead us to think that mankind may pass by and neglect great inventions lying close at their feet. For although the invention of gunpowder, and silk, and the compass, and sugar, and the like, seem to depend upon certain properties of matter and nature; the art of printing has certainly nothing which was not plain, and almost obvious, and gathered from what was already known. But in this race of invention the human mind is commonly so unlucky and awkward, that in some things it first despairs, and shortly after despises itself; and at first it seems incredible that any such thing could be invented, but after it is invented, again it appears incredible that it could have escaped men so long. And this leads him to hope that there yet remains a great mass of inventions which might be gained, not only from uncovering new properties, but also from transferring and applying those already known.

He accepted also as happy omens what he observed in the mechanical arts and their success, especially when compared with philosophy. For the mechanical arts, as if enjoying a certain vital air, grow and perfect themselves daily; while philosophy, like a statue, is adored and celebrated, but moves not. The former also are seen rude and commonly without proportion and cumbrous in the hands of their first authors; but afterwards get new strength and aptness. The latter is in its greatest vigour with its first author, and afterwards declines. And the real cause of this different success is that in the mechanical arts, the wits of many meet together in one; but in philosophy the wits of all are spoiled by one. For after they have surrendered themselves they give no increase, but are employed in the servile office of dressing and attending one. Wherefore every philosophy, torn up from the roots of experience from which it first sprung and grew, becomes dead matter. And roused by this thought he observed also, that the means of arts and sciences are, by universal consent, empirical or

rational, that is, philosophical; but he has not yet seen these well put together and united. For the empirical, like the ant, only collects and uses; the rational, like the spider, spins from itself. But the practice of the bee is midway, which draws materials from the flowers of both garden and field, but transmutes and digests them by a faculty of its own. Nor is the work of true philosophy different, which stores up the matter supplied by natural history and mechanical experiments, not raw in the memory, but changed and prepared in the understanding. And he is aware that there are some of the empirical who wish not to be held as merely empirical, and of the reasoners who aim at seeming industrious and plain in practice. But these have been and are the artifices of a few, aiming at the character of each excelling in his own sect; though, in reality, there has always been a division and almost antipathy between these faculties. So he thought there was hope of excellent effects from a close and confirmed union of them.

He saw also with pleasure that he found an infinite expense of wit, time, and means, which men employ in matters and pursuits that, rightly considered, are useless; while if a small part of them were turned to what is sound and useful, it might conquer every difficulty. Nor is there any reason to fear the multitude of particulars, since the phenomena of the arts are but a handful to the reasonings of the mind when disunited and distracted from the evidence of things. Now all this that has been said has its effect in producing hope; but, above all, the most certain hope is from the errors of the time past. And (as some one said of the maladministration of civil government) that may be the best for the future, which is the worst on looking to the past; for if such errors cease (and giving warning is the first step towards it), there would be a very great change in things. But if men had passed through the course of so many years, without being able to make any progress, no hope could remain. For then it would be clear that the difficulty was in the matter and subject (which are out of our power), not in the instrument (which is within it), that is in the things and their obscurity, not in the human mind and its working. But now it appears that the way is not stopped up by any block or barrier, but turns from the path of men: it does, therefore, cause in some measure the fear of solitude, but threatens nothing more. In fine he determined that, if even a much weaker and less sensible air breathed from that new continent, it should yet be attempted. For

there is not the same danger in not trying a thing and not succeeding in it; since, in the former case, the loss of a great benefit, in the latter, of a little human labour is concerned. In truth, both from what has and has not been said, he saw well that there was sufficient hope, not only for a diligent man to make trial, but also for a prudent and sober one to give credit.

He thought also, that, when the desire is kindled, and the hope formed, we must look to the means of performance. This is then what appeared to him generally in that matter; and he thought fit to enclose and embrace it in naked and open sentences.

He saw that things must be done entirely otherwise than they are now; and therefore that the disproving of the past is a kind of oracle for what is to come.

He thought that theories, and opinions, and common notions, as far as can be obtained from the stiffness and firmness of the mind, should be entirely done away with; and that the understanding should begin anew plainly and fairly with particulars; since there is no other entrance open to the kingdom of nature than to the kingdom of heaven, into which no one may enter except in the form of a little child.

He thought that a body and mass of particulars both from their number, kind, and certainty or subtilty sufficient for information, might be collected and stored up, both from natural history and mechanical experiments, the latter especially because nature displays herself more fully when she is held and pressed by art than at her own liberty. He thought that this mass should be reduced and digested into tables and regular order, that the understanding may be able to act upon it and perform its office; since even the divine word did not work upon a mass of things without order.

He thought that we must not suddenly pass from the particulars digested into tables, to the inquisition after new particulars (which is nevertheless itself a useful thing, and, like a kind of learned experience), but that we should first proceed to general and large comprehensions, and so far indulge the natural bent of the understanding. But at the same time he saw that the natural but vicious motion and impulse of the mind to jump from particulars to high and general comprehensions (such as what are called the first principles of arts and things), and to get at the rest by descending through the middle ones,

must be altogether checked; but the nearest comprehensions must be first drawn out and discovered, and then the middle ones, and we must climb the true ladder by repeated steps. For the paths of thought and understanding almost agree with that twofold way in morals, sung by the ancients; for one road, smooth at the entrance, leads to pathless wilds, the other, steep and difficult at first, ends in level road.

He thought that such a form of induction should be introduced as should conclude generally from certain instances, so that it can be proved that there cannot be found a contradictory instance, lest by chance we pronounce from fewer than are adequate, and from those which are at our feet; and (as one of the ancients said) seek knowledge in our private worlds, and not in the public one. He saw that that comprehension only should be approved of and received, which was not made and fitted to the measure of the particulars from which it was derived, but which was rather more ample and lax, and supported its amplitude and laxity by the designation of new particulars as a sort of suretyship, lest we should stop at what is already known, or perchance in too wide an embrace catch shadows and abstract forms. He saw that many things beside these should be invented to work notably, not so much to the perfecting of the matter, as to the shortening of the labour, and to the speeding of men's harvest from it. And whether all this be rightly thought or otherwise, we must, if need be, appeal from the opinions, and stand by the effects.

He thought also that what he is treating of is rather performance than opinion, and that it lays the foundations not of any sect or school, but of immense utility and enlargement. Wherefore thought must be taken not only about accomplishing the matter, but about communicating and transmitting it, which is of equal consequence. But he found that men minister to their love of fame and pomp by sometimes publishing, sometimes concealing the knowledge of things which they think they have got; and that they who propose what is least solid are, more than others, used to barter what they offer in an obscure and doubtful light, that they may more easily swell the sails of their vanity. But he thought that he was handling a subject which it were unbecoming to defile with any ambition or affectation; but yet that he must needs descend to the recollection (unless indeed he were very inexperienced in affairs and minds, and would begin his journey without any search) that inveterate errors like the ravings of the

lunatic, must be subdued by art and contrivance, and are aggravated by violence and opposition. We must, therefore, use prudence, and humour them (as far as we can with simplicity and candour), that contradictions may be extinguished before they are inflamed. For this object he is preparing a work on nature, which may destroy errors with the least harshness, and enter the senses of mankind without violence; which would be easier from his not bearing himself as a leader, but bringing and scattering light from nature herself, so that there may be no future need of a leader. But as time meanwhile glides away, and he has been more engaged in business than he wished; it seems a long work; especially when he considers the uncertainty of life, and pants to lay up something in safety. It therefore seemed to him that something simpler might be proposed which, though not uttered to the many, might perchance at least be sufficient to preserve so salutary a matter from abortion. And after considering the matter, and weighing it long and attentively, it seemed to him the best way that tables of invention, or formulæ of just inquisition, that is, a mass of particulars, arranged for the work of the understanding, should be offered in some subjects, by way of an exemplar and almost visible description of the work. For nothing can be found to place in a clearer light the right road or the wanderings of error; or show more plainly that what is offered is but words: nor which would be more carefully avoided by the man who either mistrusted his scheme, or desired it to be caught at and celebrated above its deserts. But, if it is not allowed him to complete his designs, as there are nevertheless human minds of a strong and lofty character, it may be that, even without more assistance, taking the hint from what is offered, they may be able to look for and master the rest of themselves. For he is almost of opinion (as some one said) that this will be enough for the wise, though even more would not be for the dull. But he saw that it would be too abrupt to begin his teaching with the tables themselves; and therefore that he should say something suitable by way of preface, which he thinks he has now done, and that all which has been hitherto said leads only thither. Lastly, he saw that, if any good be found in what has been or shall be said, it should be dedicated as the fat of the sacrifice to God, and to men in God's similitude, who procure the good of mankind by true affection and benevolence.

G. W.

OF THE

PRINCIPLES AND ORIGINS OF NATURE,

ACCORDING TO THE FABLES OF CUPID AND HEAVEN: OR, THE PHILOSOPHY OF PARMENIDES, TELESIUS, AND PARTICULARLY OF DEMOCRITUS, AS EXHIBITED IN THE FABLE CONCERNING CUPID.

THE fables of the ancients respecting Cupid or Love cannot be made to agree in one and the same person. They indeed profess to speak of two Cupids of two different periods, the one the most ancient of the gods, the other of a much later era. At present we will treat of the ancient Cupid. They relate that this Cupid was the most ancient of the gods, and therefore of all things, excepting chaos, which is said to have been coeval with him. This Cupid had no parent, but being united to heaven, was the father of the gods and of all things. Some indeed would derive him from an egg over which Night brooded. Different attributes are ascribed to him, so that he is represented as a boy blind, naked, winged, and armed with darts. His chief and especial influence is over the uniting of bodies. To him were given the keys of the earth, the sea, and the sky. Another and younger Cupid is also celebrated in fable, the son of Venus. To him are ascribed the attributes of the ancient Cupid, besides many peculiar to himself. This fable, with the sequel respecting heaven, seems to embrace in a concise parable the doctrine of the elements of things and of the origin of the world, and to agree with that of Democritus, except that it appears somewhat closer, more reasonable, and clearer. For the observations of that confessedly acute and accurate philosopher nevertheless were of a too diffusive nature, and did not seem to keep their proper limit, and to confine and support themselves sufficiently. And indeed these dogmas, which lie veiled in the parable, although better regulated, are yet of such a nature as to appear to have come from the mind left to itself, and not uniformly and gradually assisted by experience; for this seems to have been the common fault of antiquity. But it must first be remarked, that the opinions brought forward in this part of my trea-

tise were the conclusions and productions of unassisted reason, and rested on perception alone, the failing and imperfect oracles of which are deservedly rejected, now that the higher and more certain light of the Divine Word has shone upon men. That chaos therefore which was coeval with Cupid signified the confused and disordered mass or collection of matter. But matter itself with its power and nature, in a word, the elements of things were shadowed out in Cupid himself. He is introduced without a parent, that is, without a cause: for cause is as it were the parent of effect; and in tropical discourse nothing is therefore more usual than for the parent to stand for cause; and the offspring for effect. But there cannot be in nature (for we always except God) any cause of the first matter and of its proper influence and action, for there is nothing prior in time to the first matter. Therefore there is no efficient nor any thing more known to nature; there is therefore neither genus nor form. Wherefore whatever primitive matter is, together with its influence and action, it is sui generis, and admits of no definition drawn from perception, and is to be taken just as it is found, and not to be judged of from any preconceived idea. For the mode of it, if it is given to us to know it, cannot be judged of by means of its cause, seeing that it is, next to God, the cause of causes, itself without a cause. For there is a certain real limit of causes in nature, and it would argue levity and inexperience in a philosopher to require or imagine a cause for the last and positive power and law of nature, as much as it would not to demand a cause in those that are subordinate.

On this account the ancients have fabled Cupid to be without a parent, that is, without a cause. And they did so not without design. Nay, perhaps there is not any thing more important; for nothing has more corrupted philosophy than the seeking after the parents of Cupid; I mean, that philosophers have not received and embraced the elements of things as they are found in nature, as a certain fixed and positive doctrine, and as it were by an experimental trust in them; but have rather deduced them from the laws of words, and from dialectics and slight mathematical conclusions and common notions and similar wanderings of the mind beyond the bounds of nature. This therefore must be constantly in the philosopher's thoughts, that Cupid is without parents, lest perchance his understanding turn aside to empty questions; because in universal perceptions of this kind the human mind becomes diffusive, and departs from the right use of itself and of its objects,

and, whilst it tends toward things more distant, falls back upon those that are nearer. For when, through its own limited capacity, it is accustomed to be most affected by those things which occur familiarly to it, and which can enter and strike the mind suddenly; it comes to pass that when it stretches itself toward those things which, according to experience, are for the most part universal, and nevertheless is unwilling to rest satisfied, then, as if desirous of something more within the reach of its knowledge, it turns itself to those things which have most effected or allured it, and imagines them to be more causative and palpable than those universals. Therefore it has been now laid down that the first essence of things, or Cupid, is without a cause.

We have now to inquire into the mode of this thing which is uncaused: and the mode of it is likewise very obscure, which indeed the fable elegantly hints in Cupid being hatched beneath the brooding wing of night. So at least the Inspired Philosopher saith, "God hath made all things beautiful in their seasons: He hath also set the world in their heart, yet so that no man can find out the work that God maketh from the beginning unto the end." For the great law of essence and nature which cuts and runs through the vicissitudes of things (which law seems to be described in the compass of the words "the work which God wrought from the beginning even to the end"), the power lodged by God in the primitive particles, from the multiplication of which the whole variety of things might spring forth and be composed, may indeed just strike, but cannot enter deeply the mind of man. But that saying concerning the egg of night is very aptly referred to those proofs by means of which our Cupid is brought to light. For those proofs which are concluded by means of affirmatives, seem to be the offspring of light; those which are concluded by means of negatives and exclusions, may be called the offspring of darkness and night: and Cupid is in truth the egg sprung from night; for all the knowledge we can gather respecting him comes by the way of negatives and exclusions. But a proof gathered by exclusions has still some degree of ignorance in it, and is a kind of night as to that which is included in it: whence Democritus admirably remarked that the atoms or seeds and their properties were like nothing that falls under the observation of sense, and held them to be of a dark and secret nature. He therefore pronounced of them, "They are neither like fire, nor any other thing, the body of which is perceptible by sense, or open to the touch."

And again he says of their nature, " but it is requisite the elements in the work of creation should put forth a secret and dark nature, lest any contrarious and opposing principle arise." Therefore atoms are neither like sparks of fire nor drops of water, nor bubbles of air, nor grains of sand, nor the minute particles of spirit or ether. Nor is the power and form of them a something heavy or light, or hot or cold, or dense or rare, or hard or soft, as are found in larger bodies, since those powers and the rest of that order are compounded and wrought together. And in like manner the natural motion of an atom is neither that motion of descent which is called natural, nor a motion opposed to that force, nor a motion of expansion and contraction, nor of impulsion and connexion, nor the rotatory motion of the heavenly bodies, nor any other of the greater motions simply. But notwithstanding this, in the body of an atom are the elements of all bodies, and in the nature of an atom the beginning of all motions and natural properties. But yet in this very point, namely, the motion of an atom as compared with the motion of greater substances, the philosophy of the parable appears to differ from that of Democritus. For he is not only opposed to the parable, but inconsistent if not contradictory in his more copious assertions on this head. For he should have ascribed an heterogeneous motion to an atom not less than an heterogeneous body and power. But he out of the motions of greater substances, has chosen two, to ascribe them as primitive motions to atoms, namely, the descent of heavy and the ascent of light bodies, (which he explained by the striking or the percussion of the more heavy, in forcing upwards the less heavy, bodies). But the parable all along preserves the heterogeneous, and exclusive nature it ascribes to atoms, as well in speaking of its motion as of its substance. But the parable further intimates that this exclusion has its limit, for night does not brood over the egg for ever: and it is certainly proper to the Deity, that in our inquiry into his nature by means of the senses exclusions should not terminate in affirmatives. And there is another reason for this, namely, that after the due exclusions and negations something should be affirmed and settled, and that the egg should be produced as it were by a seasonable and mature incubation; not only that the egg should be brought forth by night, but also that the person of Cupid should be delivered of the egg: that is, that not only should an obscure notion upon this subject be originated, but one that is distinct. Thus much upon demonstrations, as far as they

can be given, upon the first matter, and I think in accordance with the parable.

We come now to Cupid himself, the primitive matter and its properties, involved in so great darkness; and let us see what light the parable can throw upon it. And here I am aware that opinions of this sort the most incredible have entered men's mind. Certainly was this danger incurred here by the philosophy of Democritus itself upon atoms, which from its seeming acuteness and profundity, and for its remoteness from common notions was childishly entertained by the vulgar, but unsettled and nearly overthrown by the arguments of other philosophies which came nearer the vulgar comprehension: and yet he was the admiration of his age, and was styled Pentathlus for his multifarious erudition, and was deemed by universal consent the greatest of natural philosophers, and obtained the name of a wise man. Nor could even the opposition of Aristotle (who like the Ottomans could not feel firm upon his throne until he had murdered his brother philosophers; and who was solicitous, as appears from his own words, that posterity should not doubt his dogmas) effect by his violence, nor the majesty of Plato effect by reverence the demolition of this philosophy of Democritus. But whilst the dicta of Aristotle and Plato were celebrated with applause and professorial ostentation in the schools, the philosophy of Democritus was in great repute amongst the wiser sort, and those who more closely gave themselves to the depths and silence of contemplation. It kept its ground and was approved in the era of Roman letters; for Cicero every where makes mention of him with perfect approbation; and soon after we read the panegyric of the poet, who appears to echo after the manner of the poets the sentiment of his times, whose wisdom shows that in a land of dulness and beneath a Bœotian sky, the greatest and the most illustrious men can spring up. (Juv. Sat. 10. v. 48.)

Neither Aristotle therefore nor Plato, but Genseric, Attila, and the barbarians were the ruin of this philosophy. For then, after that human learning had suffered shipwreck, those records of the Aristotelian and Platonic philosophy as being lighter and more inflated matter, were preserved and came down to our times, whilst the more solid sank and went into oblivion. I cannot but consider, on the other hand, the philosophy of Democritus worthy of being rescued from neglect, especially since it agrees in

most things with the authority of antiquity. In the first place then, Cupid is described as a certain person, and to him are attributed infancy, wings, arrows, and other attributes, concerning which we will afterward speak separately. But this we assume in the meanwhile, that the ancients laid down the primitive matter (such as can be the origin of things) with a form and properties, not abstract, potential and informal. And certainly that matter which is stripped and passive seems altogether an invention of the human mind, and to have sprung thence, for those things are mostly present to the human understanding which it most imbibes, and with which itself is most moved. Hence it is that forms as they are called seem to exist more than either matter or action, because the one is hid, the other glides before us; the one is not so strongly impressed, the other constantly inheres. But forms on the other hand are deemed evident and lasting, so that the primitive and common matter seems as it were an accessory, and to be in the place of a support to them; but every sort of action only an emanation from the form, and forms therefore to be in every respect worthy of the higher rank. And hence also seems to be derived the kingdom of forms and ideas in essences, by the addition of a kind of phantastic matter. Some things moreover have grown out of this superstition; (from want of judgment having, as might have been expected, followed this error) abstract ideas and their powers have been introduced; with such confidence and authority that this troop of dreamers had nearly overpowered the more sober class of thinkers. But these follies have for the most part disappeared, although one person in our age, with more daring than advantage, made it his endeavour to raise and prop them up when they were of themselves on the decline. I think however that it can to an unprejudiced person be easily shown how, contrary to reason, abstract matter was made into an element. It arose thus; men supposed that forms endued with action subsisted by themselves, but none thought that matter thus subsisted by itself; not even those who considered it an element; and it seemed unreasonable and contrary to the nature of an inquiry upon the elements of things to make entities out of mere imaginations. And it is not our object to search how we can most conveniently conceive of the nature of entities or distinguish them, but what are in truth the first and simplest possible of all entities, from which all others are derived. But the first ones

ought no less to possess a real existence than those which flow from it; rather more. For it has its own peculiar essence, and from it come all the rest. But the assertions that have been made respecting abstract matter are as absurd as it would be to say that the universe and nature were made out of categories and such dialectic notions, as out of elements. For the difference is by no means important between asserting that the world sprang from matter and form and privation, and asserting that it arose out of substance and the contrary qualities. But almost all the ancients, Empedocles, Anaxagoras, Anaximenes, Heraclitus, Democritus, though disagreeing in other respects upon the prime matter, joined in this, that they held an active matter with a form, both arranging its own form and having within itself the principle of motion. Nor can any one think otherwise without leaving experience altogether. All these then submitted their mind to nature. But Plato subjected the world to his contemplations, and Aristotle his contemplations to terms: for the studies of men were at that time verging toward logomachies and disputations, and leaving the severer investigation of truth. Wherefore dogmas of this nature are rather to be condemned in the mass than refuted in detail. For they come not from a desire of knowledge, but of much speaking: and that abstract matter is not the matter of the universe, but matter for disputation. For a true philosopher will dissect not sever nature (for they who will not dissect, must pull her asunder), and the prime matter is to be laid down joined with the primitive form, as also with the first principle of motion, as it is found. For the abstraction of motion has also given rise to innumerable devices concerning spirits, life, and the like, as if there were not laid a sufficient ground for them through matter and form, but they depended on their own peculiar elements. But these three are not to be separated, but only distinguished, and matter is to be so treated (whatever it be) in regard of its adornment, appendages, and form, as that all kind of influence, essence, action, and natural motion may appear to be its emanation and consequence. Nor need we fear that from this that inquiry should stagnate, or that variety which we perceive should become incapable of explanation, as will be shown hereafter. And that the first matter is possessed of form the parable teaches in making Cupid a definite person. Yet so that matter in the mass was at first without form: for chaos is without form, Cupid is a

person. And this perfectly agrees with Holy Scripture. For it is not written that God created in the beginning the matter of chaos, but the heavens and the earth.

There is also subjoined a description of the state of things as it was before the work of the days, in which distinct mention is made of the heaven and earth, which are the names of forms, but yet that the mass according to the whole was without form. But Cupid is introduced into the parable personified, yet so as that he is naked. Therefore, after those who speak of matter as abstract, they err next (though in a contrary way), who speak of matter as not unclothed. And on this topic I have inserted some remarks, in treating upon what kind of proofs are suited to the subject of the first matter, and upon the heterogeneous nature of the first matter. But the proper place for this subject, upon which we shall now enter. We will examine, therefore, who of those who attributed the origin of things to matter endowed with form, held a native and bare form of matter, and who, on the other hand, a form spread over it and shapen. There are, in all, four sects of those who have hazarded opinions on this subject.—The first is of those who maintain one element of things, but set up a diversity of entities in the unfixed and distributable nature of the same element.—The second is of those who maintain an element one in substance, and that fixed and invariable, but derive a diversity of entities through the various magnitudes, figures, and positions of this kind of element.—The third is of those who maintain more elements, and a diversity of entities on the ground of their temperament and commixture. The fourth, of those who lay down an infinite or, at least, very numerous body of elements of things, but with their species and forms; and these have no need of inventing something to lead things to a various principle, seeing they already separate nature from a primitive element. Among these only the second sect seems to me to set forth Cupid as he is, native and unclothed. The first introduces him as veiled, the third with a coat, the fourth with a cloak and mask.

For the better explication of the parable, I will make a few remarks on each. In the first place, then, of those who have laid down but one first element, I find none who affirm that of the earth. The nature of the earth indeed was against it; quiet, and senseless, and inactive, but yielding to the influence of the heavens, of fire, and other things; so that none thought of asserting this of the earth. Yet the wisdom of the ancients assigned to the earth the

next place after chaos, making it first the parent, then the bride of the heaven, from which union proceed all things. But we are not to suppose from this, that the ancients ever thought of the earth as the principle of essence, but as the element or rather origin of the system. We, therefore, leave this subject to the parable on heaven that follows; where we will inquire into the origin of things, which inquiry comes after that of their elements.

Thales made water the prime element. For he saw that matter was mostly disposed in moisture, and that in water. But he deemed that it was right to make that the element of things in which the virtues and powers of entities, especially the elements of generations and renovations, were mostly found. He remarked that the generating of animals was by moisture, and that the seeds and kernels of plants, as long as they vegetated and were not dried up, were moist and tender. He remarked that metals melted and flowed, and were, as it were, the thickened juices of the earth, or rather a kind of mineral waters. He remarked that the earth itself was enriched and renewed by showers or the irrigation of rivers; and that the earth and loam seemed nothing but the dregs and sediments of water; but that the air was very evidently the expiration and expansion of water, and that fire was not conceived of itself, nor altogether continued, or was kept alive of itself, but from and through moisture; and, moreover, that that fat of moisture, in which the fire and flame are supported and live, appeared a kind of maturity and concoction of water; and that a body and mass of water was spread through the whole as a common fuel; that the sea surrounded the land; that there was a very vast and subterraneous force of sweet waters, whence come springs and rivers which, like veins, carry the waters through both the face and bowels of the earth; and that in the heights above were immense congregations of vapours and waters, and, as it were, another universe of waters, for the reparation and renovation of the waters below, and of the sea. He, moreover, thought that those waters and vapours fed the heavenly fires, for that those worlds could not subsist without some nourishment, and that this was the only nourishment that they could possess. He remarked that the figure of water, as seen in drops or particles of water, was that of the universe, round and spherical, and that the undulation of water was apparent even in air and fire; lastly, that the motion of water was suited to its nature, neither too slow nor too quick, and of

all generations the most numerous was the generation of fishes and water-animals. But Anaximenes chose air for the one sole element. For if bulk is to come into consideration in treating upon the elements of things, air seems by far the most bulky, and to occupy the greatest space. For unless a separate vacuum be given, or the superstition of the heterogeneous nature of the heavenly and sublunary bodies be resorted to, whatever is extended from the globe of the earth to the furthest region of the heavenly expanse, and is neither star nor meteor, seems to be filled with aerial substance. And the abode of this earthly globe is thought to be as a point in comparison of the circuit of the heavens. But in the ether itself, how very small a portion is besprinkled with stars, when in the nearer spheres they are seen single, in the last, although there is a great number of them, yet, considering the interstellar spaces, but a small part of space seems to be occupied by stars; so that they all appear to swim in one immense sea of ether. Nor is that part of ether and spirit inconsiderable, which has its seat and settlement in the waters and the hollow places of the earth, whence the waters receive their tides. They are, moreover, extended, and swell; but not only has the earth its porousness, but also its tremors and agitations, evident signs of wind and air pent up within it. But if a middle nature is proper to elements, in order to the being susceptible of so great a variety, that is certainly found in air. For air is, as it were, the common bond of things, not only because it is every where close at hand, and takes the place of other things, and possesses itself of void spaces, but so much the more from its appearing to have a middle and a diaphorous nature. For this is that body which receives and conveys light, darkness, and the tints of all colours and shades; which, by its admirably nice motion, discriminates the impressions and notes of harmonic and, what is by far more remarkable, of articulate sounds, which enters without confusing the differences of scents, not only those general ones of pure and fœtid, of dull, acute, and the like, but also the peculiar and specific, as of the rose or the violet; which accommodates itself equally to those remarkable and very powerful qualities of hot and cold, also of wet and dry, in which aqueous vapours, dense fogs, spirits of salts, fumes of metals fly suspended in the height; lastly, in which the rays of light and the closer agreements and variances of things move and make a noise; so that the air is, as it were, a second chaos, in which so many seeds of things move,

wander, try their powers, and are tried. Lastly, if you consider its genial and vivifying power, which conducts you to the elements of things and manifests them, they seem to be also the more excellent parts of the air, so that the words air, spirit, and life, are often used as if they were synonymous. And, with reason, since some degree of respiration seems the inseparable companion of life a little more advanced (excepting those little beginnings of life in embryos and in eggs), so that fishes are suffocated by the congealing of water. Also fire itself, unless kept alive by the surrounding body of air, is extinguished, and seems only worn out air irritated and inflamed; as water, on the other hand, can appear to be the conjunction and reception of air. Nor is there any necessity to maintain that the earth constantly exhales the air, nor that it passes through water into the form of air. But Heraclitus, who was more acute, but not so much to be relied upon, held fire to be the element of things. For it was not a middle nature, which is wont to be extremely uncertain and corruptible, but the highest and most perfect nature, which is a considerable bound, as it were, to corruption and change, which Heraclitus sought for instituting the origin of things. Now he saw that the greatest variety and perturbation of things was found in solid and consistent bodies. For such bodies can be organic and, as it were, a kind of machines, which acquire innumerable variations according to their shape, as the bodies of animals and plants. Even among these, such as are not organic upon a closer inspection, are found to be very dissimilar. For how great is the dissimilarity between those very parts of animals which are called similar? the brain, the chrystalline humour, the white of the eye, the bones, membranes, cartilages, nerves, veins, flesh, fat, marrow, blood, sperm, breath, chyle, and the rest; also between the parts of vegetables, roots, barks, stalks, leaves, flowers, seeds, and the like? But fossils are not certainly organic, but yet are variously mixed together in one kind, and show mutually a very great variety. Wherefore that base of the diversity of entities, so vast, so broad, so extended, in which so vast an apparatus of things is manifested and is constantly present, seems to be fixed in a solid and constant nature. But the power of formation seems plainly to desert the bodies of liquids. For there is not found in all nature one animal or plant in a body of mere fluid. That infinite variety of form therefore is cut off and taken away from the nature of liquid. No small variety however does

remain, as is clear in the so great variety of fusibles, juices, distilled bodies, and the like. But in aerial and pneumatic bodies a much greater variety is enclosed, and there seems drawn over them a somewhat promiscuous similitude of things. That influence indeed of colours and tastes, by which liquids are in some instances distinguished, ceases indeed altogether here; but that of scents and of some other properties remains yet, so as that they pass through, are confused, and do not inhere; so that on the whole variety disappears in proportion as we approach the nature of fire. But after we are come to the nature of fire, and that rectified and purer, every organ, every peculiar property, every dissimilarity is put off, and nature seems to coalesce as it were in a pyramidal point, and to have reached the limit of its own proper action. Heraclitus called therefore the kindling of fire peace, because it made nature one; but generation war, because it made it manifold. In order therefore to explain by some means the manner in which things ebbed and flowed as a stream, from variety to simplicity and from simplicity to variety, he supposed fire was condensed and then rarified, yet so as that rarifying toward the nature of fire should be the direct and progressive action of nature; but the densation as it were a receding from and leaving of nature. He thought that both took place by fate and at certain periods, (according to the sum), so that there would be at some time or other a conflagration of the world, which is now moved in its orbit, and then a renovation, and so on successively for ever. But he held a diverse order of incension and extinction, if any one is well versed in that slight remain of information concerning him and his opinions which hath descended to our time. But in the scale of incension he in no way differed from the usual and well known opinion, that the progress of rarification and extenuation was from earth to water, from water to air, from air to fire: but he did not hold the same return, but plainly inverted the order. For he asserted that fire brought out earth through extinction as a kind of dregs and soot of fire; that they next conceived and collected moisture, whence came the flowing forth of water, which again emitted and breathed out air, so that a sudden not a gradual change is made from fire to water. And these or better notions did those conceive who asserted one element of things, looking upon nature simply not for the sake of strife. And they are indeed to be praised, because they ascribed but one vest to Cupid,

that which approaches nearest to bareness, and as it were a veil of the thinnest and lightest kind. But by the vest of Cupid I mean a certain form attributed to primary matter, which is asserted to be substantially homogeneous with the form of some one of the secondary entities. It will be easy to prove that the assertions we have recited respecting water, air, fire, are groundless, and here we can take them by the genus, and not severally by the species, into consideration. In the first place then the ancients did not inquire with accuracy into the nature of elements, but only made it their object to find out the chief virtues of those bodies that were clearly under the senses, and those virtues they supposed were the elements of things, through a seeming not a real and true superiority of nature. For they thought that such a nature was worthy of being said to be solely that which it appeared: but every thing else they held to be the nature itself, though by no means according with the appearance; so that they seem to have spoken metaphorically or to have been under some fascination, since the more powerful impression drew the remaining properties after it. But a true philosopher would look with equal attention to all the circumstances, and would consider those to be the elements of things which agreed with the very least and fewest and the most solitary of entities, and not only with the greatest, most numerous, and most prolific. For although we men are most struck by those entities which mostly meet our sight, the bosom of nature is open to them all. But if they hold that their opinion of an element, not on account of superiority of nature but simply, they seem indeed to fall into the adoption of a harsher figure; since the thing is plainly made equivocal, and their assertion cannot be predicated either of natural fire, air, or water, but of a certain phantastical and notional fire (and so of the rest), which retains the name without the definition of fire. They seem too forced into the same difficulties with those who assert abstract matter. For as they introduce an entire, so do these a partial, potential, and phantastic matter. For they lay down matter in one respect (as, that is, their supposed element) with form and action; in other respects only potential. Nor is any thing gained by this kind of sole principle more than by the supposition of abstract matter, unless it be deemed an advantage that it is entertainable by the comprehension of man, in which human contemplation is more fixed and acquiesces, and through which the notion of the element itself is made somewhat fuller,

but as to every other circumstance more difficult and abstruse. But predicaments did not rule then, so as that this element of abstract nature might lie hid under the protecting tutelage of the predicament of the substance. No one dared therefore to feign a kind of matter entirely phantastic, but decided upon a principle according to perception, a certain true ens; but yet (proceeding in this respect too far) the mode of its distribution phantastic. For they find nothing, nay, they do not feign any thing by which, by an appetite or incitement, or in any way, method, or guidance, this their element may degenerate from itself and again return to itself. But when throughout the universe there appears so great an army of contrary powers, density, rarity, heat, cold, light, darkness, animation, inanimation, and of many others which contend with each other and fall into privation or nothingness, to suppose that all these flow from one and the same fount of a material nature, and yet not to point out any way in which this can take place, is the part of a mind overcome by distraction, and seems a departure from the spirit of true inquiry. For if the thing were clearly made out by sense it were to be borne with, though the mode of it were involved in obscurity; again, if by the strength of reason any suitable and credible mode could be searched out, one might learn perhaps from appearances; but our assent is by no means to be demanded to the existence of entities, neither evident to the senses nor admitting of any probable elucidation from reason. Besides, if there were but one element of things, there ought to be seen in all things some signs of it, and certain more excellent parts, and a certain preeminent quality in their nature. It ought moreover to be in open sight, that it might the more easily be accessible to all things, and might diffuse itself throughout its orbit. But none of these things can be made out from their dogmas. For the earth, which is cut off from the honour of being deemed an element, appears to receive and cherish natures opposite to these three principal, seeing that to the mobility and lucid nature of fire it opposes the natures of rest and darkness; to the tenuity and softness of air, in like manner, the natures of density and hardness; and to the humidity and yieldingness of water, a nature dry, stubborn, and rough, and the earth occupies a middle rank, the rest being denied this claim. Moreover if it were the only principle of things, it ought to have a natural fitness equal to both the generation and dissolution of things. For it as much belongs to the nature of an

element that things should be dissolved into it as that they should be produced out of it. But this is not the case: but of those bodies air and fire seem quite incapacitated from administering any generating material, and only to be adapted to the receiving of bodies resolved into them. But, on the other hand, water is very favourable and conducive to generation, but with respect to resolution or restoration of bodies the reverse; as would be easily perceptible, if showers cease a little while. Nay, putrefaction itself by no means reduces things to pure and raw water. But this was by far their greatest error, that they made an element of that which is corruptible and mortal. This they do, when they introduce an element which lays down and leaves its own nature in its compounds. For "whatever by undergoing change departs from its proper limits, this change is forthwith the death of that thing which it was before." But we shall need to take this into our account more when we have come to the proper place for considering the third sect, which held more elements than one, which sect has at once more strength and more prejudice. We will therefore treat of these opinions severally and not in the mass.

Of those, then, who asserted a plurality of elements we will place by themselves such as make them also infinite. For the consideration of infinity pertains to the parable of the heaven. But of the ancients Parmenides held two principles, the fire and the earth, or heaven and earth. For he asserted that the sun and stars were true fire, pure and limpid, not degenerate as our fire, which, like Vulcan after his fall, is the worse for its transmission. These opinions were brought up again in our age by Telesius, who was deeply versed in the peripatetic system (if, indeed, there can be said to be system in it), which yet he turned against itself; but unhappy in the stating of propositions, and more able to pull down than to build up. There are indeed but very slight and sparing memorials left us of the conceptions of Parmenides. But we see the foundations of a similar opinion obviously laid in Plutarch, "De primo frigido," which seems to be taken from an ancient work then in being, but now lost. For they contain not a few opinions more acute and solid than the authors generally were; and by these Telesius seems to have been roused both to catch them up with earnestness, and to pursue them with vigour, in his commentaries on the nature of things. These are the dogmas of this sect: that the first forms and

first entities are active, and that so the first substances also, cold and heat; that these nevertheless exist incorporeally, but that there is subjoined to them a passive and potential matter, which has a corporeal magnitude, and is equally susceptive of either nature, itself at the same time void of all action: that light is the budding forth of heat, but of heat scattered, which, being multiplied by coition, is made firm and sensible; that darkness is, in like manner, the destitution and commingling of nature radiating from cold; that rarity and density are the textures, and, as it were, the webs of heat and cold; but that heat and cold produce and manufacture them, as it were, cold by condensing and thickening the work, heat by widening and extending it: that from such kind of textures is put into bodies a disposition of their parts toward motion, either suitable to motion or somewhat averse to it, in the thinner bodies prompt and naturally fitted to motion, in the denser inclining to torpor and averse to it: that heat therefore excites and effects motion through a rarified space, and that cold represses and stops motion through a dense space: wherefore say they there are four coessential natures and conjoined, and those twofold, preserving that order mutually which I have mentioned (for heat and cold are the sources, the others are emanations), yet that, nevertheless, they are ever concomitant and inseparable: that those four natures are heat, light, rarity, and motion: that again, there are four opposed to these; cold, darkness, denseness, and immobility: that the seats and regions of the first conjugation is in the heaven, the stars, and especially in the sun; for that the heaven from its surpassing and pure heat, and from its matter mostly extended, is the hottest, most clear, and most rare, and highly inclined to motion; that the earth, on the other hand, owing to its pure and unbroken cold, and from its matter being mostly contracted, was the most cold, dark, and dense, utterly motionless, and altogether unsuited by nature to motion; but that the heights of heaven preserve their nature entire and unhurt, admitting some diversity among themselves, but altogether removed from the violence and attack of a contrary: that there is the same consistency through the lower parts of the earth, that only the extreme parts where there is a nearness and meeting of the contraries is uneasy, and suffers opposition from the mutual quarter; that so the heaven is in its whole mass and substance full of heat, and entirely free from every contrary nature, but unequally, being in some parts more, in others

less heated: that the body of the stars is more intensely hot, the interstellary space less so: and, moreover, that some stars are more endued with heat than others, and are of a more vivid and darting kind of fire; yet so as that the contrary nature of cold, or any degree of it, never penetrates thither; for that the body of the stars receive a diversity, but not a contrariety of nature: and that no judgment can be formed from common fire of the heat or fire of the heavenly bodies, which is pure, and in its natural state; that our fire is indeed remote from its own natural place, tremulous, surrounded with contrary influences, of a low nature, requiring, as it were, nourishment for its very existence, and wandering about, but that being placed in the heavens, disjoined from the impetus of any contrary force, it kept its own place, was preserved out of its own power, and out of that of similar influences, and preserved its own proper course of action in freedom and unmolested. Also that the whole heaven was full of light, though not in the same proportion throughout. For since of the stars that are known and can be reckoned up, some which can only be seen when the heavens are unclouded, and since there are in the galaxy clusters of little stars which by their union give forth a white appearance but do not seem distinct bodies of light, none can doubt that there are very many stars invisible to us, and that so the whole of the heaven is one body endowed with light, though not with light so strong and darting, nor with rays so deep and condensed as to pass beyond such vast distances, and to reach our sight. And he held that the whole heaven was of a thin and subtle substance, and that there was nothing in it that was crowded together, nothing forcedly compact, but that in this region matter was more expanded, in that less. Lastly, that the motion of the heaven was such as most suited a moveable body, conversive or rotatory, for the circular motion is without a bound, and that for its own sake, as it were, this motion is in a right line, to a limit, and to some object, and as if for the purpose of attaining rest. That, therefore, the whole heaven was borne along by a circular motion, and that no part of it was without this motion, but that, nevertheless, as in the heat, light, and subtlety of the heavenly nature there exists inequality, so it is also seen in the motion of the heavens, and the more clearly since it admits more of human observation, and can even be measured.

But that orbicular motion can differ both in its speed and

in its course; in speed so as to be either quicker or slower, in its course so as to be in a perfect circle, or to have somewhat of a spiral direction, and not to restore itself plainly to the same bound (for a spiral line is compounded of a right line and a circle), and that so the heaven is subject to variety of speed, and to deflection from recovery of itself, or to a spiral course. For both the fixed stars and the planets are of unequal speed, and the planets evidently turn from tropic to tropic, and the higher the heavenly bodies are, the greater speed they acquire and the nearer compass. For if the phenomena are taken simply, and as they appear, and there be laid down one diurnal motion in the heavens, simple and natural, and that mathematical beauty of reducing motions to perfect circles be rejected, and spiral lines received, and those contrarieties of motions in consecutive order from east to west which they call the motion of the primum mobile, and again from west to east, which they call the planetary motion, are reduced to one, by still keeping the difference of the time in the return through over haste, and through leaving of the course to the difference as to the smoothness of the zodiac through the windings, it is plain that it will take place which I have said: for instance, that the moon, which is the lowest of the planets, will go the most slowly in a curve the least deep, and most expanded. And there may seem to this sect to be (on account of the distance from the opposite side) a firm and constant kind of nature of this portion of the heaven. But Telesius does not clearly lay down whether he preserved the ancient bounds so as to conceive that whatever was situated above the moon was the same with the moon itself, or whether he thought that an opposing power ascended higher. But he held a portion of the earth (which is the seat of an opposite nature) to be in the same way quite of an unmixed and solid nature, and impenetrable by heavenly influences. But he considered that there was no reason for inquiring into the nature of that portion, only that it was endowed with these four natures, cold, darkness, density, and rest, and those perfect, and no way impaired. But he assigns to the generation of things the part of the earth toward its surface as a kind of bark or incrustation, and that all the entities which have come to our knowledge in any way, even the heaviest, hardest, and the lowest down, metals, stones, the sea are produced from the earth, subdued in some part by the heat of the heaven, and which has already conceived somewhat of heat, radiation, tenuity, and

mobility, and which partakes of a middle nature between the sun and the pure earth. It is requisite, therefore, that that pure earth be placed lower than the bottom of the sea, than minerals, and every thing that is generated: and that from that pure earth, even to the moon, or perhaps higher, there be placed a certain middle nature, proceeding from the temperaments and refractions of the heaven and earth. But having sufficiently fortified the interior of both kingdoms, he proceeds to the march and to the war. For in the space within the outermost region of heaven and the innermost of earth, is all kind of tumult, and conflict, and horror; as it is with empires, the borders of which are infested with incursions whilst the interior provinces enjoy profound peace. That so these natures with their concretions have the power of incessantly generating and multiplying themselves, and of pouring themselves on every side, and of occupying the whole bulk of nature, and of mutually opposing and invading each other, and of casting one the other from their proper seats, and of establishing themselves in them; that they also have the power of another nature and its actions, both those that are proper to perception and apprehension, and that from this kind of perception they have the power of moving and adjusting themselves; and that from this conflict is deduced the whole variety of all entities, actions, and influences. But it seems elsewhere to have ascribed to it, though rather by the way and hesitatingly, somewhat of the property of matter; first, that it should not admit of increase or diminution through forms and active entities, but should be made up of one whole: then, that the motion of gravity or descent should be referred to it. He moreover inserts something on the blackness of matter: but that he does plainly; that heat and cold by the same force and power remit their strength in extended matter, expand it in contracted, since they do not fill their own measure but that of matter. But Telesius devises a method by which to explain the rise of so various a fecundity of entities out of this discord. And first he has regard to the earth, though the inferior element, and shows why it is that it has not been and never will be absorbed and destroyed by the sun. The chief reason he makes to be the immense distance of the earth from the fixed stars, sufficiently great from the sun itself, and such as it should be, well proportioned in measure. Secondly, the declination of the sun's rays from the perpendicular respect being had to the different

parts of the earth, that for instance the sun should never be vertically above the greater part of the earth, or the falling of his rays perpendicular; so that it can never occupy the whole globe of the earth with any very powerful body of heat. Thirdly, the obliquity of the sun's motion in its passage through the zodiac, respect being had to the same parts of the earth whence the heat of the sun, in whatever power it is, is not incessantly increased, but returns by greater intervals. Fourthly, the celerity of the sun in respect of his diurnal motion which accomplishes so great a course in so small a space of time, whence arises a less delay of heat, nor is there any moment of time in which the heat may settle. Fifthly, the continuation of series of bodies between the sun and the earth; so that the sun does not send forth an unbroken power of heat through a vacuum, but passing through so many resisting bodies, and having to do and to contend with each, is weakened over this immense space; and so much the more, since the further it proceeds and the weaker it becomes, so much the more increase of resistance does it find in the bodies, and most of all after arriving at the surface of the earth, where there seems not only a resistance, but even some degree of repulsion. And he thus lays down his theory on the process of change. That there is as it were a deadly and interminable war, and that those contrary natures do not come together by any compact, nor by a third, excepting primitive matter. That either nature therefore naturally seeks the destruction of the other, and the putting into matter itself and our nature only, so that it is the object of each (as he repeatedly and very plainly saith) to effect a change of the other, of the sun, the change of the earth into the sun; and of the earth, the change of the sun into the earth; and that the regularity and justly proportioned motions of all things present no obstacle to this theory; nor that every action has in its due course its beginning, its progress, its increase, its diminution, and its rest: that nevertheless not any of these happen through the laws of order, but entirely through want of restraint and order; for that the whole difference whether of excess or inferiority in influence and action is not occasioned by the direction of the effort of the motion itself (which begets a whole), but from the force and curb of the opposite nature. That the diversity, multiplicity, and even perplexity of operation is owing altogether to one of these three; the power of heat, the arrangement of the matter, or the mode of its reduction;

which three have nevertheless an inherent and mutual connexion and causality. That heat itself differs in power, quantity, speed, mean, and succession: that succession itself is varied in most bodies by tendency to approach or recede, whether by greater or less effort, by sudden motion, by gradual, or by return or repetition through greater and less intervals, and by changes of this kind. That calorics are therefore of a vast diversity in their nature and power, according to their purity and impurity, respect being had to their first source, the sun. Nor does heat cherish every kind of heat: but after they differ mutually a good number of degrees, they mutually destroy themselves not less than cold natures, and assume their peculiar powers of action, and are opposed to the acts the one of the other; so that Telesius makes the less with respect to the much greater caloric natures to hold the place as it were of traitors and conspirators with the cold against them. And so that vivid heat, which is in fire and darts, utterly destroys that slight heat which seems to glide secretly in water; and in like manner the preternatural heat of putrid humors suffocates and extinguishes natural heat: but that there is a great difference as to the fulness of a body of heat, is too plain to need explanation. For one or two coals of fire do not throw out such a warmth as many do together; and that the effect of the fulness of heat is remarkably shown in the multiplication of the sun's heat through the reflection of his rays; for the number of his rays is doubled through simple reflection, multiplied though various. But to the quantity or copiousness of heat there should be ascribed or added also its union, which is best seen by the obliquity and perpendicular of rays, with which the nearer the direct and reflex ray meets, and toward the acuter angles, the greater degree of heat it sends forth in proportion. Nay even the Sun himself, when amongst those greater and more potent fires of the fixed stars, the Serpent, the Dog-star, Spica, emit greater heat. But that the delay of heat is evidently an operation of the greatest moment, since all the influences of nature have respect to times, so as that some time is required to the putting its influences into action, and a considerable time to the giving them strength. That so the delay of heat turns equal heat into progressive and unequal, because the antecedent and subsequent heat is joined at the same time; that that is apparent in the autumnal heats because they are perceived to be more ardent in the solstitial heats, and in the after-

noons of summer because they are found to be more ardent in the middays of those seasons; also, that in colder regions the feebleness of the heat is sometimes compensated by the delay and length of the summer days; but that the power and efficacy of the mean is remarkable in the conveyance of heat. For that hence the temperature of the seasons is very various, so that the atmosphere is found, by an inconstancy that is discoverable, to be sometimes cold in summer days, sometimes moist in winter days, the sun in the mean while preserving his legitimate course and ordinary distance; that the corn and vine are more changed by the south winds and a stormy sky; and that the whole position and emission of the atmosphere, at one time pestilential and morbid, at another genial and healthful, according to the various revolutions of the year, has its rise from this, namely, from the varying of the medium of the air, which gathers its diverse disposition from the very vicissitude and alteration of the seasons, perhaps in a long series. But that as there is a multifold ratio, so is there a very great virtue of the succession of heat, and of the order in which heat follows heat. For that the sun could not send out so numerous and prolific a generation, unless the configuration of the body of the sun moving toward the earth, and the parts of the earth, were a partaker of the very great inequality and variation; for the sun is moved both in a circle and rapidly, and obliquely, and recalls itself, so as to be both absent and present, both nearer and more remote, and more perpendicular and more oblique, and returning swifter and slower, so as that the heat emanating from the sun is never the same, nor ever recovers itself in a little while (excepting under the tropics); so that so great a variation of the power generating admirably agrees with this so great variation in that which is generated. To which can be added the very diverse nature of the medium or vehicle. That the other circumstances asserted of the inequality and degrees of heat alone, can be referred to the vicissitudes and varieties of succession in different heats. That Aristotle therefore rightly attributed the generation and corruption of things to the oblique path of the sun, making that as it were their efficient cause, if he had not indeed corrupted the truth he discovered, through his unbounded rage for uttering decisions and of making himself the lawgiver of nature, and of adapting and of settling all things so as to make them harmonize with his dogmas. For that

he ought to have assigned generation and corruption (which is never entirely privative, but is productive of a second generation) to the inequality of the sun's heat, according to the whole that is of the approaching and receding of the sun jointly, not the generation to the approaching, the corruption to the receding separately, which he did, blunderingly and following the vulgar error. But if any should think it strange that the generation of things is attributed to the sun, when it is asserted that the sun is fire, but fire generates nothing, this, saith he, is a groundless objection: for that which is asserted respecting a heterogeneous nature of the heats of the sun and of fire, is a mere phantasy. For that the operations are infinite in which the action of the sun and the action of fire come together, as in the ripening of fruits, the conservation of tender plants, and of those which are used to a clement temperature; in cold regions, in the hatching of eggs, the restoration of waters to their clearness (for we join the solar and animal heat), in the resuscitation of frozen animalculæ, in the calling of them up, and of vapours and the like. But nevertheless that our fire is a bad imitator, and does not well imitate the actions of the sun or come near them, since the sun's heat hath three properties, which common fire can but poorly imitate under any circumstances. First, that from its distance it is less and more bland in its very degree; but that this of a kind imitable in some way; for such a measure of heat is rather unknown than unattainable. Secondly, that in flowing and increasing through so many and such media it borrows and obtains a considerable degree of generative influence; but chiefly because it is increased, lessened, advances or retires with so regular an inequality, but never succeeds to itself capriciously or with haste. Which two last properties are almost inimitable by fire, though the thing may be accomplished by very considerate and laborious measures. Such are the assertions of Telesius on the diversity of heats.

But he scarcely takes any notice of the contrary principle of cold and of its distribution; except perhaps what will be now said in the second place on the disposition of matter, might seem to him to suffice upon this head, which, nevertheless, he ought not to have supposed, since it was not his mind to make cold by any means the privation of heat, but as an active principle its rival and competitor. But his dissertations on the arrangement of matter go to show

how matter is affected by heat, subdued or changed by it, the subject of cold being entirely overlooked. But I will add what he could, on his principles, have said respecting this subject, for it is my desire to go through, and with impartiality, the theories and suppositions of all the philosophers. He could have said that the seat of cold, being fixed and unmoved, most admirably agreed with the mobile and versatile structure of heat, as the anvil to the hammer. For if both principles were possessed of variation and change, they would doubtless produce contrary and momentaneous entities. That the immense regions of heat (that is the heavens), moreover, were in some degree compensated by the compact nature of the globe of the earth and circumjacent bodies, since not the space but the quantity of matter in the space is taken into the account, but that the nature of cold, its powers and proportions need but few words, since experience does not furnish us with any certain deductions respecting it. We have, therefore, our common fire, the representative, as it were, of the sun, to show to us the nature of heat. But there is no substitution of the cold of the earth, within man's reach, for the trying experiments with. For that those hardenings and congealings of snow which, in winter and in cold regions, breathe themselves out into air from the globe and circuit of the earth, are plainly warmths and baths, owing to the nature of the first cold shut up in the bowels of the earth; so that the cold, which is in the power and under the perception of men, is something like as if they had no other heat than that which emanates from the sun in summer, and in warm regions; which, if compared with the fire of a heated furnace, may be deemed a refreshing coolness. But I shall take up less time upon those things that are pretended on this subject. We will inquire, therefore, in order into the nature of what Telesius has asserted respecting the arrangement of matter upon which heat acts; the power of which is such as to advance, impede, or change the action itself of heat. The ratio of this is fourfold. The first difference is taken from the preinexistent heat or nonpreinexistent heat; the second from the abundance or the scarcity of the matter; the third from the degrees of the reduction; the fourth from the closing or opening of the body reduced. As for the first, Telesius supposes in all entities known to us, that there exists a certain latent heat, though not subject to the touch, which heat is joined with a new or overspreading heat; moreover, that itself is excited and inflamed by the same

adventitious heat to the performing its acts even in its proper measure. He esteems it a considerable proof of this, that there is no one entity, neither metal, stone, water, nor air, which does not acquire warmth by touch, and also by the application of fire or of a warm body. Which would not surely be the case, unless there were a preinexistent heat of a certain latent preparation for a new and manifest heat. That even that excess or diminution, or facility and slowness, which are found in the conceiving of heat in entities, agrees with the measure of the preinexistent heat; that the air grows warm by a small heat, and such as is quite imperceptible in an aqueous body; also that water is more easily endued with warmth than a stone, or metal, or glass. For that any of these, as a metal or a stone, should appear to acquire warmth sooner than water, that is, only on the surface, not within the body, because consistent bodies are less communicable in their parts than liquids. That, therefore, the outermost parts of a metal are sooner warmed than those of water, the whole bulk later. The second difference is made to depend upon the coacervation and extension of matter. If it be dense, the strength of the heat is more united, and through the union increased and made more intense; if on the other hand it be looser, the strength is more dispersed, and through the dispersion weakened. That the heat, therefore, of unknown metals is more powerful than of boiling water, nay, than of flame itself, unless that the flame would, from its subtle nature, pierce more. For that the flame of coals or of fuel, unless roused by wind, so as through motion to penetrate more easily, is not very violent; nay, that some flames (as of spirit of wine, especially if inflamed, and in a small quantity and dispersed) is of so mild a heat, as to be endurable by the hand. The third difference, which is taken from the reduction of matter, is manifold; for he makes seven degrees of reduction, of which the first is milder, which is the arrangement of matter, showing the body in some degree yielding to greater violence, and especially susceptible of extension, in fine flexible or ductile. The second is softness, when there is no need of greater force, but the body yields even by a light impulsion and to the touch, or the hand itself, without any apparent resistance. The third is viscosity or tenacity, which is in a high degree the principle of fluidity. For a viscous body seems to begin to flow and go on at the contact and embrace of another body, and not to come to an end of itself, although it does not

flow willingly and of itself; for the fluid easily follows itself, but is more viscous with respect to another body. The fourth is the fluid itself, when the body partaking of the interior spirit is in willing motion and follows itself, and is not easily bounded or brought to a stand. The fifth is vapour, when a body is attenuated till it becomes intangible, which yields, flows, undulates, and becomes tremulous, with a greater agility and mobility. The sixth is breathing, which is a certain vapour more concocted, and matured, and subdued, so as to be capable of receiving the nature of fire. The seventh is the air itself, but Telesius contends that the air is endued with a native heat, and that considerable and very powerful, for that in the coldest regions the air is never congealed or condensed: and that another proof of this is, that all air that is confined and separated from the main body of air, and left to itself, evidently collects heat, as in wool and fibrous substances; and that the air in confined situations is found to suffocate respiration, which is the consequence of its heat; and that this arises from the confined air beginning to exert its own nature, since the air out of doors, and under the open sky, is cooled by the cold which the globe of the earth is constantly emitting and exhaling: and also that our common air hath a certain celestial property, since it in some degree partakes of light; which appears from the power of those animals which can see in the night and in dark places. And such, according to Telesius, is the order of the arrangement of matter, in the means, to wit, since the extremes, although on one side hard bodies, and on the other fire itself, are not reckoned as the limits of the means. But besides these simple degrees, he searches out a great diversity in the arrangement of matter according to the similarity or dissimilarity of the body, since portions of matter compounded and united in one body can be referred equally either to one of the beforementioned degrees, or unequally to different. For that a very great difference follows thence in the operation of heat. And that so a fourth difference is necessarily brought in from the nature and even position of a body upon which heat acts, whether close or porous and open. For when heat operates in an open and exposed situation, it does so in order and severally, by attenuating and at the same time by drawing out and separating. But when in a confined and compact body, it operates in the mass, not putting out any heat, but by the new and the old heat uniting and conspiring, whence it follows that it causes

more powerful, intrinsic, and subtle alterations and reductions. But more will be said on this subject when we come to treat of the method of reduction. But in the meanwhile Telesius is fully occupied, and is strangely put to it to account for the method of the divorce and separation of their primary connatural qualities, heat, light, tenuity, and mobility, and the four opposite qualities, as they happen to be in bodies: since some bodies are found to be warm or admirably prepared to receive warmth, and yet to be at the same time dense, motionless, and dark; others are found to be subtle, mobile, lucid, or white, and yet cold; and so of the rest, one certain quality to wit existing in some things, whilst the remaining qualities are not in accordance with it; but others participate in two of these natures, but are without other two, by a very singular exchange and intercourse. And this part Telesius does not skilfully manage, but carries himself like his opponents; who making their conjectures before their experiments, when they come to the particular subjects themselves, abuse their talents and their subjects, and wretchedly pervert both, and are yet admirably dexterous and successful (if you believe their own words), in whatever way they explain themselves. But he concludes the subject in despair, intimating that although the quantity and copiousness of heat and the arrangement of the matter can be marked out in a vague manner and in the mass, that yet their accurate and exact proportions and their distinct measures are out of the reach of human inquiry: yet so that (by what manner is placed among the things that cannot be settled) the diversity of the disposition of matter can be better known than the strength and degrees of heat, and that yet in these very things is placed (if any where) the highest point of human knowledge and power. But after a plain acknowledgment of despair, he still goes further than mere wishes and prayers for more certainty. For so he said; "What heat moreover or quantity, that is, what strength of heat, and what quantity of it, that is which turns, and how it turns the earth, and those things that are entities into such bodies as itself, is not to be inquired into, since we have no means of coming to this knowledge. For on what principle shall it be allowed us to distribute the strength of heat, and heat itself as it were into degrees, or to perceive clearly the copiousness and quantity of matter which is endowed with it, and to assign a certain quantity, disposition, and certain actions of matter to certain and deter-

minate powers and copiousness of heat, or, on the contrary, to assign a fixed and certain copiousness of heat to a certain quantity and certain actions of matter: Oh, that this might be obtained by those who have both time and intellect at command adequate to this investigation, and who could, in the possession of the most perfect tranquillity search into nature; that mankind might not only become then masters of every kind of knowledge, but almost of every kind of power. This, indeed, is said with more honesty than is found in his opponents, who, if they cannot attain their objects, affirm that their attainment is impossible from the nature of the art or object itself, so that no art can be condemned, since itself is both pleader and judge. There remains that which was the third, namely, the method of reduction. This Telesius dispatches by a threefold sentence. The first is that which we noticed by the way before, that no symbolization is understood (as in the doctrine of the Peripatetics) through which substances, by an agreement, as it were, are nourished, and act in unison: for that all generation, and every effect in a natural body is the result of victory and predominance, not of agreement or treaty. This, indeed, is no new dogma, since Aristotle remarked it in the doctrine of Empedocles; for that Empedocles, indeed, though he maintains contention and amity to be the efficient principles of things, yet in his explications of causes generally makes use of their contention, and seems to forget their amity. The second is that heat by its own proper action constantly changes a substance into moisture, and that dryness by no means coalesces with heat, nor moisture with cold; for that to attenuate and to moisten is the same, and that what is extremely thin is also extremely moist; if through humid be understood that which very easily yields, is divided into parts, again recovers itself and is with difficulty limited or made to settle. All which are more the properties of fire than of air, which is for the most part moist, according to the Peripatetics; and that so heat continually draws, feeds upon, extends, inserts, and generates humidity; that cold, on the contrary, acts altogether on dryness, concretion, and hardness; where Aristotle deems him deficient in acuteness, and inconsistent, and impatient of the decisions of experience, in joining heat with dryness. For that the drying of substances by heat is accidental merely; namely, in a dissimilar body, and that is composed of some parts more thick, of others more thin, by drawing out, and (by means of attenuation) giving

vent to the thinner part, till the thicker part is forced thence, and compresses itself more; which thicker part, nevertheless, if a rather violent heat comes, flows also of itself, as is evident in bricks: for, in the first place, heat, not so fervent, makes the loam into bricks on the thinner part having evaporated; but a more powerful heat even dissolves that bricky substance into glass. And these two dogmata can be considered as the answers to errors; the third plainly affirms, and not only so, but clearly distinguishes the method of reduction. This is twofold, either by rejection or conversion: and one or other of these modes is brought out into act, according to the power of the heat, and the arrangement of matter. But two canons belong to this subject. The one is, that when heat and cold concur in vast bulk, and as it were with any even force, an ejection follows. For entities, like armies, are moved from their place and thrust forward. But when it takes place in a less quantity, then a conversion follows: for the entities are destroyed, and lose rather their nature than their place. There is a remarkable exemplification of this in the higher regions of the air, which, although they come nearer to the celestial heat, are yet found colder than the confines of the earth. For in those regions, after arriving nearer to the seat of the prime heat, the heat, collecting itself, at once casts down, and thrusts off, and hinders from approach the whole power of the cold which had ascended. He saith that the same thing, moreover, may happen, that there may be through the depths of the earth greater heats than on the surface; to wit, after the approach to the seat of the prime cold, which rousing itself throws off the heat with great force, and avoids it, and returns into its own nature. The second canon is that in an open body ejection in a close conversion follows. He asserts that this is notably instanced in closed vessels, where the emission of an attenuated body (which we commonly call spirit) being restrained, begets deep and intrinsical alterations and fermentations in bodies; but that this takes place in like manner when a body, from its parts being compacted, is to itself like a closed vessel. Such are the opinions of Telesius, and, perhaps, of Parmenides, on the elements of things, excepting that Telesius added, of his own accord, *Hyle*, through his being led astray by the Peripatetic notions.

And the opinions of Telesius might indeed have an air of probability if man were taken out of nature together

with the mechanical arts which try matter, and if we simply looked to the fabric of the world. For it is a kind of pastoral philosophy, which tranquilly and as it were at ease contemplates the world. For, indeed, he is not amiss in laying down the mundane system, but miserably fails upon the subject of the elements. And there is, indeed, in his system itself a great failure, in its being supposed capable of an eternal nature, the idea of a chaos and the mutations of the universal scheme of things being altogether omitted. For that philosophy, whether of Telesius or of the Peripatetics, or any other which so prepares and furnishes its system as not to derive it from chaos, is evidently of slight foundation, and altogether conceived from the narrowness of human imagination. For so in entire accordance with sense doth the philosopher assert the eternity of matter, and deny that of the world (as the world appears to us), which was the opinion of the wisest ancients, and to which opinion Democritus seems to have approached. And this is also the testimony of scripture; but with this great difference, that the scriptures derive the origin of matter from God, the philosophers from itself. For we gather from our faith three dogmas on this point; first, that matter was formed from nothing; secondly, that the production of the system was through the word of omnipotence, and not that matter endued itself with form and of itself came forth from chaos; thirdly, that before the fall that form was the best of those which matter (such as it was created) could take: but to none of these dogmas could these philosophical theories ascend. For they shudder at the thoughts of a creation from nothing, and deem that this form of things was produced after many windings and attempts of matter, nor are they troubled as to conceiving of the most excellent kind of system, since theirs is asserted to be liable to decline and to change. We must then rest upon the decisions of faith and upon its supports. But perhaps we need not inquire whether that created matter, after a long course of ages, from the power at first put into it could gather and change itself into that most excellent form (which, leaving these windings, it did immediately at the command of the divine word). For the representation of time and the formation of a substance are equally miraculous effects of the same omnipotence. But the divine nature seems to have designed glorifying itself equally in either emanation: first, by omnipotently working upon ens and matter by creating substance from nothing;

secondly, upon motion and time, by anticipating the order of nature and accelerating the process of substance. But these pertain to the parable of heaven, where we will discuss more fully what we are now just intimating: and so we go on to the elements of Telesius. And here I wish it had been universally and at once agreed upon not to fetch entities out of nonentities and elements out of nonelements, and so to fall into manifest contradiction. But an abstract element is not an ens; again, a mortal entity is not an element; so that a necessity plainly invincible drives men (if they would be consistent) to the idea of an atom, which is a true ens, having matter, form, dimension, place, antitype, appetite, motion, and emanation. It at the same time remains unshaken and eternal during the dissolution of all natural bodies. For since there are so many and various corruptions taking place in greater bodies, it is requisite that what remains as the centre immutable, should either be a somewhat potential or very small. But it is not potential, for the first potential cannot be like the rest which are potential, which are one thing in act, another thing in power. But it is requisite that it should be plainly abstract, since it refuses all act and contains all power. And so it remains that this immutable should be of the smallest size; unless perchance some one will assert that no elements exist, but that one thing serves for elements to another, that the law and order of mutation are things constant and eternal, that the essence itself is inconstant and mutable. And it would indeed be better plainly to make an assertion of this sort, than in laying down some eternal principle to fall into the still greater absurdity of making that principle a phantastic one. For that first method seems to have some design and end, that things should be changed into the world, but this, none, which for entities adopts mere notions and mental abstractions. And yet the impossibility of this being the case I shall hereafter show. Yet his *Hyle* pleased Telesius, which he transferred from a later age after the birth of Parmenides' philosophy. But Telesius instituted an evidently unaccountable and unequal contest between his elements in action, whether you consider their forces or their kind of war. For, as to their forces, the earth is alone, but the heaven has a great army; the earth is as a little speck, the heaven hath its immense regions. Nor can it relieve this difficulty that the earth and its connaturals are asserted to be of the most compact matter, and the heaven and etherial substances on

the other hand, of the most expanded. For although this indeed is a very essential difference, yet it will by no means equalize the forces even with so great an intermediate space. But the strength of the opinion of Telesius turns chiefly upon this, if an equal portion as it were of *Hyle* (according to the quantum, not according to the expansion) be assigned to both acting elements, so that the things can last, and the system be made and established. For whoever will think with Telesius on other points, and will receive the surpassing power of *Hyle*, especially in so great an excess, in one principle compared with another, will involve himself in an inextricable difficulty. In the dialogue, therefore, of Plutarch, "De facie in orbe lunæ," this consideration is very wisely proposed, that it is improbable that nature in the dispersion of matter shut up the properties of a compact body into the sole globe of the earth, when there were in the mean time so many revolving bodies in the heavens. Yet Gilbertus indulged to such excess in this imagination as to assert that not only the earth and the moon but many other solid and opaque globes were scattered amongst the bodies of light through the expanse of heaven. Nay, the Peripatetics themselves, after they had made the heavens eternal through their own condition, and things sublunary by succession and renovation, did not imagine that they had sufficiently guarded their tenet till they assigned to the elements as it were equal portions of matter. For this is that which they fable concerning that tenfold portion by which the surrounding element is superior to the inner element. But I do not bring these things forward, because none of them are to my mind, but to show that it is perfectly improbable and unnatural to maintain with Telesius that the earth is a principle acting in contrariety to the heavens. And the difficulty will be greatly increased if besides the quantum itself we consider the unequal influence and action of the heaven and the earth. For the condition of contest must be lost altogether, if the attack of the hostile weapons be borne by the one side, but do not reach the other, but fall first. But it is plain that the power of the sun is projected toward the earth, but none can promise that the influence of the earth ever reaches the sun. For of all the influences of nature, the influence of light and shade is conveyed to the greatest distance and is circumfused with the greatest space or orbit. But the shade of the earth is bounded on this side the sun, whilst the light of the sun, if the earth

were transparent, could beat across the globe of the earth. Heat and cold, in particular (of which we are now treating), are never found to overcome so great a space in the conveyance of their influence, as light and shade. Therefore, if the shade of the earth does not reach the sun, much less is it in accordance with this to suppose that the cold of the earth travels thither. If indeed the sun and heat acted upon certain mediate bodies, whether the influence of a contrary principle could not ascend, or by any means hinder their action, it is requisite that the sun and heat should occupy whatever are the nearest bodies to them, and then should join also the more remote, so that in time the conflagration of Heraclitus should take place by the solar and celestial nature gradually descending, and making a nearer approach to the earth and its confines. Nor does this well harmonize, that that power of imparting and multiplying its own nature and of turning other things into itself, which Telesius attributes to the elements, should not operate on similar equally or more than opposite bodies; so that the heaven ought already to be lit up and the stars to be engaged in mutual conflict. But, to come nearer the point, those four demonstrations ought to be set forth, which even singly, much more conjointly, can evidently subvert the philosophy of Telesius respecting the elements. Of these, the first is that there are found in things some actions and effects, even of things the most potent and the most widely diffused, which cannot by any means be referred to heat and cold. The second is, that there are found some natures of which heat and cold are the consequences and effects, and that not through the excitation of preinexistent heat, or through the application of heat approximating to them, but through those things by which heat and cold are infused and generated in their first esse. The ground of an element, therefore, fails in either side in them, both because there is a something not from them, and because themselves are from something. The third is, that even those which derive their origin from heat and cold (which certainly are very many), yet proceed from them as from an efficient and organs, not as from their proper and nearest source. Fourthly, that that conjugation of the four connaturals is altogether blended and confused. Therefore I will speak of these singly. But some may think the time misspent in so minute an examination of the philosophy of Telesius, a philosopher of no great popularity or celebrity. But the fastidiousness of such objectors I dismiss. I have

a favourable opinion of Telesius, and recognize in him a lover of truth, a profitable servant of science, a reformer of some tenets, and the first indeed of the moderns. Nor have I to do with him so much as Telesius as in his character of restorer of the philosophy of Parmenides, and as such he is entitled to great regard. But my chief reason for so largely discussing this part of our subject is, that in Telesius, who is the first who meets our view, we find occasion to consider very many subjects which can be transferred, as replies to following sects (of whom we shall hereafter speak) to avoid repetition. For there are fibres of errors (though of different kinds) wonderfully complicated, which can yet in many instances be cut away by one answer. But as we began to say, we must see what kind of influences and actions are found in things which cannot by any concord of things or violence of ingenuity be referred to heat and cold. We must assume then, in the first place, what is granted by Telesius, that the sum of matter remains eternally the same without increase or diminution. This property, by which matter preserves and sustains itself, he transmits as passive, and as it were pertaining more to the measure of quantity than to form and action, as if there were no need of reckoning it to heat or cold, which are considered the sources of acting forms only and influences, for that matter is not simply but altogether destitute of active influence. And these assertions flow from an incredible error, unless the miracle be removed by its having been an inveterate and general opinion. For there is scarcely any error similar than that a person should not deem the active influence that virtue infused into matter, (through which it is kept from decay, so that the very least portion of matter is not buried in the whole bulk of the world, nor destroyed by the power of all the active influences, or in any way annihilated, and can be reduced to order; nay, can occupy a portion of space and preserve resistance with impenetrable dimension, and itself by turns be capable of some action, and not forsake itself). When, on the contrary, it is by far the most potent of all influences, and evidently insuperable and as it were a mere fate and necessity. Yet this virtue Telesius does not attempt to refer to heat or cold. And rightly so: for neither do fire or numbness and congelation add or detract any thing from it nor have any power over it, when it yet meanwhile flourishes in the sun, at the centre of the earth and every where. But he seems to fail, in that he recog-

nizes a certain and defined bulk of matter, is blind to that influence which should defend itself and preserve itself in its several parts, and (as it were be clouded in the darkest shades of the Peripatetics) puts that in the place of an accessory, when it is mainly the principal, poising its own body, removing another, solid and adamantine in itself, and whence emanate by an inviolable authority the decrees of the possible and the impossible. In the same manner the vulgar school puerilely catches at it with an easy grasp of words, imagining that the judgment is satisfied by making a canon of the impossibility of two bodies occupying the same space, but does not take into actual and full consideration that influence and the measure of which we speak; overlooking how much depends upon it and how great a light would thence be thrown upon science. But to our point, that influence, whatever is its nature, is not comprehended in the elements of Telesius. We must now pass to that influence itself, which is as it were the antistrophe to this former, that namely which preserves the connexion of matter. For as matter will not suffer itself to be overwhelmed and perish by matter, so neither can it be separated from matter. And yet it is very doubtful whether this law of nature is equally peremptory with that other.

But Telesius like Democritus supposed a vacuum heaped together and unbounded, that each ens singly might lay down its contiguous ens, and sometimes desert it involuntarily and with difficulty (as they say), but with a greater and a subdued violence, and he endeavoured to demonstrate this by sundry experiments, adducing especially those things which are cited here and there for the denying and refuting of a vacuum, and drawing out and enlarging these in such a manner as that the ens may appear to keep that contiguity by being placed in a certain light necessity; but that if they were very much agitated they would admit a vacuum; as in water-hourglasses, in which if there be rather a small aperture through which the water can descend, they will want a spiracle for the water to descend; but if a larger foramen even without a spiracle, the water being incumbent with a greater bulk on the foramen, and in no way impeding the vacuum above, is carried downwards. So in bellows, in which if you compress and shut them so that there be left no place for the air to glide in, and you afterward elevate and expand them, if the skin of the bellows be slight and weak, it will break,

not so if very thick and firm; and other experiments in like manner. But these experiments are neither exactly proved, nor are they quite satisfactory, nor conclusive on the question, and though Telesius thinks he adds to discoveries by means of them, and endeavours after a more subtle discernment of what others have seen but confusedly, yet he does not come off equal to his subject, nor educe a true conclusion, but fails in the means: the misfortune indeed of Telesius and the Peripatetics, who in looking into experiments are like owls, not through the inefficiency of their faculties, but through the cataracts of opinions and impatience of fixed and full contemplation. But the very difficult question how far a vacuum is to be admitted, and with respect to what spaces there can be a coition or separation of seeds, and what there is on this head that is peremptory and invariable, I leave to my dissertation on the vacuum. Nor does it relate much to my present purpose whether nature utterly abhors a vacuum, or (as Telesius imagines himself to speak more accurately) entities delight in mutual contact. This we hold to be plain that whether it be avoidance of a vacuum or inclination to contact does not in any degree depend on heat and cold, nor does Telesius assert that it doth, nor can it be so ascribed from any appearance in the things themselves: since matter moved from its place attracts doubtless other matter, whether that be hot or cold, liquid or dry, hard or soft, friendly or adverse, so that a warm would sooner attract the coldest body to come to it, than suffer itself to be disjoined from and deserted by every kind of body. For the bond of matter is stronger than the aversion of heat and cold: and the sequacity of matter has no respect to the diversity of special forms; and so this influence of connexion is by no means from those elements of heat and cold. The two influences that are mutually opposite follow, which conferred (as may be seen) this rule of elements upon heat and cold, but by a right badly explicated. I mean those influences through which entities open and rarify themselves, dilate and expand so as to occupy a greater space, and dispose themselves into a more extensive orbit; or, other hand, shut up and condense themselves, so as to retire from the space they occupied and betake themselves to a narrower sphere. We must show, therefore, how far that influence hath its rise in heat and cold, and how far it dwells apart, and has a separate nature from that other influence. And that is certainly true, which Telesius affirms, that rarity and density are, as it were, the peculiar works of heat and cold;

for the most essential requisite, in respect of these, is that the bodies should occupy a greater and a less space; but yet these dogmas are received rather confusedly: for bodies seem sometimes to migrate from one natural site to another, and to transfer themselves, and that freely and, as it were, willingly, and changing their forms; but sometimes they seem only driven from their natural site, and to return to their accustomed site, their old form remaining the same. And that progressive influence entering on a new site is commonly determined by heat and cold: but that other restorative influence is not so. For water expands itself into vapour and air, oil likewise, and fat substances, into steam and flame, by the power of heat, and, if they have completely transmigrated, do not return. Nay even the air itself is dilated and extended by heat. But if the migration shall have been half full after the departure of heat, it easily falls back into itself; so as that there are also some properties of heat and cold in the restorative influence itself. But those which, without any intervening heat or violence, are extended and divided, even without any addition of cold or subtraction of heat, most readily are returned to their former sites when the force ceases, as in the blowing of a glass egg, and in the emptying of bellows. But that is far more evident in solid and dense bodies. For if cloth, or a string of an instrument be stretched, when the force is taken away, they leap back with great swiftness, and the same is the nature of compression. For the air, drawn together and confined with some violence, breaks forth with a considerable effort, and so the whole of that mechanical motion by which a hard is struck by a hard body, which is commonly called the motion of force, through which solid bodies are discharged, and fly through the air or water, is nothing else than the contending of the parts of the discharged body to free themselves from compression. And yet here are no traces of heat and cold. Nor can any one take occasion from Telesius to say, that a certain portion of heat and cold is assigned to each natural site, according to a fixed analogy. And that it can thus happen, that though there be no additional heat or cold, yet if the space of the body of matter be extended or contracted, the thing would return to the same state, because more or less matter is laid on the space than is in proportion to the heat or cold. But these assertions, though not absolutely absurd, seem, nevertheless, like the imaginations of men unwilling to go from their first opinions, and who do not follow reality and nature. For if heat and cold be added to bodies thus ex-

tended or compressed, and that in a greater degree accords with the body itself, as if the stretched cloth be warmed at the fire, it will not in any way make up for the thing, or extinguish the impetus of recovery. We have then made it plain that the influence of changing site does not depend, in a remarkable degree, upon heat and cold, when yet this is that very influence which assigns the greatest power to these principles. Those two influences follow which are universally recognised, through which bodies seek masses or greater congregations of things connatural with them, in observing of which, as of other subjects, men either trifle or err. For the vulgar school thinks it sufficient to have distinguished the natural from the forced motion, and to give out that heavy bodies are, by a natural motion, borne downward; light, upward. But these speculations are of very little help to philosophy. For their "nature," "art," "force," are only terms of terms and trifles. They should refer this motion not only to nature, but should seek in this very motion the particular and proper bias and inclination of the natural body. For there are many other natural motions, according to very different passive natures of things from these. The subject therefore is to be laid down according to these differences. Nay those very motions which they call violent, are more truly natural than that which they call natural; if that be more according to nature which is more powerful, or even which is more of a universal kind. For that motion of ascent and descent is not very potent, nor even universal, but as it were provincial, and for certain regions, and even yielding and subjected to other motions. Their saying that heavy bodies are borne downward, light, upward, is no more than saying that heavy are heavy, light, light bodies. For what is so predicated is assumed from the very force of the term in the subject. But if by heavy they mean dense, by light, rare, they do not advance the subject, only they lead it back rather to the adjunct and concomitant, than to the cause. But they who so explain the bias of heavy bodies as to assert that they are borne to the earth's centre, and light to the circumference and circuit of heaven, as to their proper destinations, certainly advance something, and hint at a cause, but yet with much inconsideration. For places are not influences, nor is a body affected but by a body, and every incitation of a body which seems to be seat itself, affects and endeavours a configuration toward another body, not collocation or simple site. A. T. R.

TOPICS OF INQUIRY CONCERNING LIGHT AND THE MATTER OF LIGHT.

I. *Presence Tables.*

We have first to note which are the substances, of whatever kind, that generate light; as stars, fiery meteors, flame, wood, metals, and other burning bodies, sugar in scraping or breaking it, the glowworm, the dews of salt water when it is agitated or scattered, the eyes of certain animals, some sorts of rotten wood, large quantities of snow; perhaps the air itself may possess a weak light adapted to the vision of the animals which see by night; iron and tin, when put into aqua fortis to be dissolved, boil, and without any fire produce intense heat, but whether or not they give out any light demands inquiry; the oil of lamps sparkles in very cold weather; a kind of faint light is sometimes observed in a clear night around a horse that is sweating; around the hair of certain persons, there is seen, though rarely, also a faint light, like a lambent flamule, as occurred to Lucius Martius in Spain; there was lately found an apron of a certain woman which was said to shine, yet only when rubbed; but it had been dyed in green, of which dye alum is an ingredient, and it rustled somewhat when shining. Whether alum shines or not when scraped or broken is matter of inquiry; but, I suppose, it requires more violent breaking, because it is firmer than sugar. In like manner, some stockings shine whilst you are pulling them off, whether from sweat or the dye of alum.

II. *Absence Tables.*

We must also observe which are the substances that give no light, yet have much similitude to such as do produce it. Boiling water does not give light; air though unusually heated does not give light; mirrors and diamonds, which so strikingly reflect light, give no light of their own.

In this kind of instances we have also to consider diligently the instances migratory, namely, when light, as if

transient, is present, and when absent. A burning coal gives light, but loses it instantly when strongly compressed; the crystalline humour of the glowworm, after the worm's death, even when broken and divided into parts, retains light for a short time, which however soon after fades away.

III. *Table of Degrees.*

We must remark which sorts of light are more intense and vibrating, which less: the flame of wood produces a strong light; the flame of spirit of wine, a weaker; the flame of coals when fully kindled, a very dim and scarcely visible light.

IV. *Colours of Light.*

We have to consider the colours of light, what they are, what not: some stars are white, others glittering, some red, some lead-coloured; the common sorts of flame are generally croceous, and among these the coruscations from the sky, and the sparks from flint, tend most to whiteness; the flame of sulphur is ceruleous and beautiful; but in some substances are purple flames. No green flames are observed: what most inclines to greenness, is that of the glowworm. Neither are there any crimson flames discovered: heated iron is red, but if heated somewhat more intensely, it becomes as it were white.

V. *Reflections of Light.*

We have to observe what bodies reflect light: as mirrors, water, polished metals, the moon, precious stones. All liquid bodies and such as have very equal smooth surfaces are somewhat bright: but brightness is a certain small degree of light.

We have to remark attentively, whether or not the light of one lucid body can be reflected by another lucid body; as if you took heated iron and opposed it to the sun's rays. For the reflections of light are reflected on, yet becoming gradually feebler, from mirror to mirror.

VI. *Multiplication of Light.*

The multiplication of light must next be considered: as by mirrors, perspectives, and the like, by which light may be sharpened and thrown to a distance, or also rendered subtler and softer for distinguishing visible objects; as you

may see among painters who use a phial filled with water beside their candle.

Whether all bodies of any considerable size do not reflect light, must also be considered. For light, as may be believed, either goes through or is reflected: from which cause the moon, though it be an opaque body, may yet reflect light by reason of its magnitude.

We must ascertain too whether or not the aggregation of lucid bodies multiplies light. And in regard to bodies equally lucid there is no doubt of this: but it remains for inquiry whether or not a light, which is evidently overcome and rendered of itself invisible by a greater light, doth not yet add some light. Whatsoever is bright also contributes somewhat of light, for an apartment is much lighter when hung with silk than with cloth. Light is also multiplied by refraction; for gems when cut into angles, and glass when broken, shine much more than if they were smooth.

VII. *Modes of destroying Light.*

The modes of destroying light must also be remarked: as by the exuperance of greater light, and by dense and opaque mediums. The sun's rays certainly, falling on the flame of a fire, make the flame seem like a kind of whiter smoke.

VIII. *Operations or Effects of Light.*

We have to consider the operations or effects of light, which, it seems, are few, and possess little power of changing bodies, especially solids. Light above all things generates itself, other qualities sparingly. Light doth certainly in some measure attenuate the air, is grateful to the spirits of animals, and exhilerates them; it excites the slumbering rays of all colours and visible things, for every colour is the broken image of light.

IX. *Continuance of Light.*

The continuance of light must be investigated; which, as it appears, is momentary. For light doth not illuminate an apartment more when it hath continued there for many hours, than for any single moment; which is not so in respect of heat, &c.; for the first portion of heat remains, and a new one is added to it. Yet twilight is by some thought to arise from the traces of the sun.

x. *Ways and Progress of Light.*

We have attentively to consider the ways and progress of light. Light is shed around on all sides; but it remains for inquiry whether it at the same time ascends a little, or is equally shed around upwards and downwards. The light itself generates light every where around it; so that when the body of light, on interposing a screen, is not discerned, yet the light itself illuminates every thing around, except the objects which fall within the shadow of the screen: these, however, receive some light from the light which is thrown around; for any thing within the shadow of the screen can be discerned much better than if no light at all were present. Thus the visible body of any lucid object, and the light itself, seem to be things different. Light doth not penetrate bodies which are fibrous and of unequal structure; but yet is not impeded by the solid hardness of a substance, as you shall see in glass and the like. Thus the straight line and the pores which are not transverse, alone seem to transmit light. The best conductor of light is air, which conveys light the better the purer it is. It remains for inquiry whether or not light is carried through the body of the air. Sounds certainly we see carried by winds, so that they may be heard farther when going with the wind than against it. But it remains for inquiry whether or not any thing of the kind takes place with light.

xi. *Transparency of lucid Bodies.*

We must also inquire respecting the transparency of lucid bodies. The wick of a candle is seen within the flame; but through larger flames objects reach not the sight. But again, all transparency is lost on heating any body, as may be seen in glass, which is no longer transparent when heated. The substance of air is transparent, also of water; yet these two transparent substances when mixed, as in snow or foam, are no longer transparent, but acquire a certain light of their own.

xii. *Cognations and Hostilities of Light.*

The cognations, and also the hostilities of light must be investigated. Light, as far as regards its production, has most of all cognation with three things, heat, tenuity, and motion. We must, therefore, consider the marriages and divorces of these three with light, also the degrees of these same marriages and divorces. The flame of spirit of wine

or of an ignis fatuus, has a much feebler heat than red-hot iron, but a stronger light. Glowworms, and the dews of salt water, and many of the things which we mentioned, throw out light, yet are not hot to the touch. Also burning metals are not subtle bodies, but yet they have an ardent heat. But, on the other hand, air is one of the subtlest bodies, yet it is void of light; again, this same air, and also winds, though rapid in motion, afford no light. But, on the other hand, burning metals do not lay aside their sluggish motion, nevertheless vibrate light.

But in the cognations of light, which have no relation to its production, but only to its progression, nothing is so much allied to it as sound. To the sympathies and disagreements of the two we must therefore strictly direct our attention.

In the following they agree: both light and sound are diffused around on all sides. Light and sound are conveyed through very large spaces; but light more swiftly, as we see in cannons, where the light is sooner discerned than the sound is heard, although the flame follows after. Both light and sound undergo the subtlest distinctions; as sounds in words articulate, and light in the images of all visible objects. Light and sound produce or generate almost nothing, except in the senses and spirits of animals. Light and sound are easily generated, and soon fade away. For there is no cause why any one should conceive that the sound, which continues for some time after a bell or chord has been struck, is produced at the moment of percussion; because, if you touch the bell or chord, the sound instantly ceases, from which it is evident, that the continuance of the sound is created by succession. One light is destroyed by a greater, as one sound by a greater, &c. But light and sound differ, in that light, as observed, is more rapid than sound, and goes over larger spaces: whether or not light is conveyed in the body of the air, in the same manner as sound, is uncertain: light proceeds in straight lines only, but sound in crooked lines, and in all directions. For where any thing is discerned in the shadow of a screen, there is no cause to think that the light penetrates the screen, but only that it illuminates the air around, which from its nearness doth also somewhat illustrate the air behind the screen. But a sound excited on one side of a wall is heard on the other side not much weaker. Sound also is heard within the septa of solid bodies, though fainter, as in the case of sounds within bloodstones; or when bodies

are struck under water. But light is not at all visible in a solid opaque body which is close on all sides.

Light penetrates deeper than sound, as at the bottom of waters. Every sound is produced in the motion and manifest collision of bodies: not so light.

But hostilities of light, or privations, if any like the term better, occur not. However, as is exceedingly probable, the torpor of bodies, in their parts, is very inimical to light. For almost nothing gives light that is not in its own nature remarkably mobile, or excited by heat, or motion, or vital spirit.

Yet I always mean, that not only other instances remain to be investigated (for these few we have adduced only by way of example), but also that new topical articles, as the nature of things requires, may be added.

FRANCIS BACON'S APHORISMS

AND ADVICES CONCERNING THE HELPS OF THE MIND AND THE KINDLING OF NATURAL LIGHT.

MAN, the servant and interpreter of nature, does and understands as much as he has actually or mentally observed of the order of nature: he neither knows nor can do more.

The naked hand of man, however strong and constant, suffices for but few operations, and those easy; the same, by help of instruments, performs many and obstinate operations: so is it also with the mind.

The instruments of the hand excite or direct motion: and the instruments of the mind prompt or caution the intellect.

On a given basis of matter to impose any nature, within the limits of possibility, is the intention of human power. In like manner, to know the causes of a given effect, in whatever subject, is the intention of human knowledge: which intentions coincide. For that which is in contemplation as a cause, is in operation as a medium.

The knowledge of him who knows the cause of any nature, as of whiteness or of heat, in certain subjects only, is imperfect. And the power of him, who can induce an effect upon certain substances only of such as are susceptible, is likewise imperfect.

He who knows the causes of any nature in some subjects only, knows the efficient or materiate cause, which causes are inconstant, and nothing else but vehicles and causes conveying form. But he who comprehends the unity of nature in the most dissimilar substances, knows the form of things.

He who knows the efficient and materiate causes, composes or divides things previously invented, or transfers and produces them; also in matter somewhat similar, he attaineth unto new inventions; the more deeply fixed limits of things he moveth not.

He who knows the forms, discloses and educes things which have not hitherto been done, such as neither the vicissitudes of nature, nor the diligence of experience might ever have brought into action, or as might not have entered into man's thoughts.

The same is the way and the perfection of truth and of power: this, namely, to discover the forms of things, from the knowledge of which followeth true contemplation and free operation.

The discovery of forms which proceeds by the exclusion or rejection of natures is simple and one. For all natures, which are absent in a given present nature, or present in a given absent nature, pertain not to form; and, after complete rejection or negation, the form and affirmation remains. If you inquire, for example, into the form of heat, and find water hot, yet not lucid, reject light: if you find air thin, yet not hot, reject tenuity. This is short to say, but it is reached by a long circuit.

The contemplative and the operative utterance of words differ not in reality. For when you say, light belongs not to the form of heat, it is the same as if you were to say, in producing heat it is not necessary to produce light also.

(The rest were not finished.)

Nor do these proceed under our authority. Thou, O Father, turning to the works which thy hands made, saw that all things were very good; but man, turning to the works which his hands made, saw that all was vanity and vexation of spirit. Therefore, if we have laboured amid thy works, thou wilt make us partakers of thy gratulation and of thy sabbath. We humbly entreat that this disposition may abide in us; and that by our hands the human family may be endowed with new alms from thee. These we commend to thy eternal love, through our Jesus, thy Christ, God with us.

J. A. C.

OF THE INTERPRETATION OF NATURE.

XII. SENTENCES.

Of the condition of Man.

1. MAN, the servant and interpreter of nature, does and understands as much, as he shall really or mentally observe of the order of nature, himself meanwhile inclosed around by the laws of nature.

2. The limit, therefore, of human power and knowledge, is in the faculties with which man is endowed by nature for moving and perceiving, as well as in the state of present things. For beyond these bases, those instruments avail not.

3. These faculties, though of themselves weak and inept, are yet capable, when properly and regularly managed, of setting before the judgment and use things most remote from sense and action, and of overcoming greater difficulty of works and obscurity of knowledge, than any one hath yet learned to wish.

4. Truth is one, interpretation one; but sense is oblique, the mind alien, the matter urgent; yet the work itself of interpretation is devious rather than difficult.

Of the Impediments of Interpretation.

5. Whoever, unable to doubt, and eager to affirm, shall establish principles proved (as he believes), conceded, and manifest, and, according to the unmoved truth of these, shall reject or receive others as repugnant or favourable; he shall exchange things for words, reason for insanity, the world for a fable, and shall be incapable of interpreting.

6. He who hath not mixed, confounded, and reduced into a mass, all distinction of things, which appears in the commonly established species, and the names imposed, shall not see the unity of nature, nor the legitimate lines of things, and shall not be able to interpret.

7. He who hath not first, and before all, intimately explored the movements of the human mind, and therein most

accurately distinguished the course of knowledge and the seats of error, shall find all things masked and, as it were, enchanted, and, till he undo the charm, shall be unable to interpret.

8. He who is occupied in inquiring into the causes of things obvious and compound, as flame, dreams, fever, and doth not betake himself to simple natures; first, to those which are popularly esteemed such; next, to those which by art are reduced and, as it were, sublimed to truer simplicity, he shall perhaps, if in the rest he err not, add to inventions some things not to be contemned, and next to inventions. But he shall effect nothing against the greater secularities of things, nor shall he be named an interpreter.

Of the Qualities of the Interpreter.

9. Let him who comes to interpret thus prepare and qualify himself; let him not be a follower of novelty, nor of custom or antiquity; neither let him embrace the license of contradicting or the servitude of authority. Let him not be hasty to affirm or unrestrained in doubting, but let him produce every thing marked with a certain degree of probation. Let hope be the cause of labour to him not of idleness. Let him estimate things not by their rareness, difficulty, or credit, but by their real importance. Let him manage his private affairs under a mask, yet with some regard for the provisions of things. Let him prudently observe the first entrances of errors into truths, and of truths into errors, nothing contemning or admiring. Let him know the advantages of his nature; and let him humour the nature of others, for no man is angry with the stone that is striking him. Let him as it were with one eye scan the natures of things; with the other, the uses of mankind. Of words let him distinctly know the mixed nature, which especially partakes of advantage and of inconvenience. Let him determine that with inventions the art of inventing grows. Also let him not be vain in concealing or in setting forth the knowledge which he hath obtained, but ingenuous and prudent, and let him commend his inventions, not ambitiously or spitefully, but first in a manner most vivid and fresh, that is, most fortified against the injuries of time, and most powerful for the propagation of science, then least capable of begetting errors, and, above all, such as may procure him a legitimate reader.

Of the Duty of the Interpreter.

10. Thus qualified and prepared let the interpreter proceed in this way. He will consider the condition of man, and remove the impediments of interpretation; then, girded up for his work, he will prepare a history and regular series of tables, at the same time appointing their uses, coordinations, occurrences, and appendages. He will exhibit the solitude of things and their resemblance of each other. He will also make a selection of things, and those which are most primitive or instant, that is, conduce especially to the invention of other things, or to human wants, he will place first in order. He will also observe the preeminences of instances, which can do much to shorten his work. And thus furnished, he will at length maturely and happily undertake and complete, rearrangements and new tables, and the interpretation itself now easy and following spontaneously, nay, almost as if snatched away from the mind. Which when he shall have accomplished, he will immediately perceive and number, in their pure and native light, the true, eternal, and simplest motions of nature, from the ordinate and well adjusted progress of which arises all this infinite variety, both of the present and of all ages. And meanwhile from the beginning of his work he will not fail to receive constantly, as interest, for human affairs many things and unknown. But from hence again, altogether directing himself to and intent upon the uses of mankind, and the present state of things, he will, in diverse ways, dispose and arrange the whole for action. To natures the most secret he will assign others explanatory, and to the most absent others superinductory. And then at last, like a second nature, he will institute generalities, the errors of which may be accounted monsters, yet also saving to himself the prerogative of his art.

Of the Provision of Things.

11. But thou receivest these things with languid hope and zeal, my son, and wonderest, if there remains such store of works most fruitful and altogether unknown, that they have not before this time, or now suddenly, been discovered; at the same time thou inquirest what they are by name, and promisest to thyself immortality, or freedom from pain, or transporting pleasure. But thou bestowest liberally upon thyself, my son, and wilt hunt after hope from knowledge, as from ignorance thou didst begin to

hunt despair. Is it also by art that the work must be adopted. Yet, as far as may be, I shall satisfy thy doubt, and obey thee. That these things are suddenly known, my son, is no wonder. Knowledge is of quick, time of tardy birth. Also the noble things which were invented before these, were not by the light of former knowledge gradually invented, but by chance (as they say) abundantly. But in things mechanical there is a certain extension of what is already invented, which yet deserves not the name of new invention. The way is not long, my son, but ambiguous. Yet when I say that these things have not come to view before this time, hast thou ascertained, how much was known to all antiquity, or in all countries, or even to single individuals. But I almost agree with thee, my son, and will lead thee higher by the hand. Thou doubtest not but that if men had never existed, many of the things which are made by art (as they say) would have been wanting, as marble statues, clothes. But now, and men have not they too their motions which they obey? Trūly, my son, more subtle, and more difficult to comprehend by knowledge, yet equally certain. Indeed, you will say, men obey their will. I hear, but this is nothing. Such a cause as fortune is in the universe, such is the will in man. If any thing therefore is produced yet not without man, and lies also beyond the ways of man, is it not equal to nothing? Man lights upon certain inventions which as it were present themselves, others he attains to by foreseeing the end and knowing the means. The knowledge of the means however he derives from things obvious. In which number then shall be placed those inventions which from things obvious receive neither obvious effect nor method and light of operation? Such works are called Epistemides, or daughters of science, which do not otherwise come into action than by knowledge and pure interpretation, seeing they contain nothing obvious. But between these and the obvious how many degrees thinkest thou are numbered? Receive, my son, and seal.

12. In the last place, my son, I counsel thee, as is especially necessary, with an enlightened and sober mind to distinguish the interpretation of things divine and things natural, and not to suffer these in any way to be mingled together. Errors enough there are in this kind. Nothing is learnt here unless by the similitudes of things to each other: which, though they seem most dissimilar, do yet

contain a genuine similitude known to the interpreter. But God is as similar to thee and without a figure. Wherefore expect from hence no sufficient light for the knowledge of him. Give faith to what is of faith.

CHAPTER FIRST.

Legitimate Mode of delivering.

I PERCEIVE, my son, that many in bringing forward, or on the other hand in concealing the knowledge of things which they conceive themselves to have attained, do noways conduct themselves according to their credit and duty. With equal detriment, though perhaps less blame, do those also offend who, though of excellent qualifications, are yet imprudent, and possess no art or precepts concerning the several modes of propounding things. Yet need we not make complaint regarding this malignity or ignorance in the teachers of knowledge. If indeed through the unskilfulness of teaching they were to destroy the importance of things, one might be angry not without cause; but we ought to consider that the importunity of teaching doth even by right belong to the impertinences of things. But far different from these, when I am going to impart to thee, not the fictions of ingenuity, nor the shadows of words or the devotion mingled therewith, nor certain popular observations, or certain noble experiments trimmed up into the fables of theory, but in truth to bind and make over unto thee nature with her offspring; does the argument I have before me seem worthy of being polluted by the ambition or ignorance or faultiness of any sort with which it is treated? May I be such, my son, and may I so extend to its given limits the narrowness never enough lamented of man's empire over the universe (which of things human is my sole wish), that most faithfully and from the deepest providence of my mind, and the well explored state of things and of minds, I may deliver these to thee in the most legitimate mode of all. But now which (thou wilt say) is that legitimate mode? Dismiss all art and circumstance, exhibit the matter naked to us, that we may be enabled to use our judgment. And would that you were in a condition, dearest son, to admit of this being done. Thinkest thou, that, when all the accesses and motions of all minds are besieged and obstructed by the obscurest idols deeply rooted and branded in, the sincere and po-

lished areas present themselves in the true and native rays of things? A new method must be entered upon, by which we may glide into minds the most obstructed. For as the delirium of phrenetics is subdued by art and ingenuity, but by force and contention raised to fury; so in this universal insanity we must use moderation. What? Are these conditions trifling which pertain to the legitimate mode of communicating knowledge? Do they seem to thee so free and easy, that the method is innocent, that it affords no handle or occasion for error? that it has a certain inherent and innate power of conciliating belief and repelling the injuries of time, so that knowledge thus delivered, like a plant full of life's freshness, may spread daily and grow to maturity? that it will set apart for itself, and as it were adopt, a legitimate reader? And whether I shall have accomplished all this or not, I appeal to future time.

CHAPTER SECOND.

But plainly I dissemble not, my son, that in some way I must remove those philosophasters, fuller of fables than the very poets, the ravishers of minds, falsifiers of things; and much more also, their satellites and parasites, that professorial and money-gaming crowd: who dictates the song, that I may devote them to oblivion? For what silence can there be for truth, when they are thus clamorous with their brutish and inarticulate reasons? But perhaps it were safer to condemn them by name, lest, while they flourish with such authority, if not named they may seem to be excepted, or lest any might conceive, seeing such severe and mortal hatred at work amongst them, and such contentions, that I were sent to these battles of larves and shadows to give assistance to the other side. Let us then summon Aristotle, worst of sophists, crazed with useless subtlety, base laughing stock of words. At a time when the human mind, carried by some chance as by favourable weather to somewhat of truth, did rest, he ventured to lay the severest shackles on the mind, and to compose a kind of art of insanity, and to bind us to words. Nay, also, out of his bosom have been produced and nourished those most cunning prattlers, who, when they had turned away from all perambulation of this earth, and from all light of things and of history, exhibited to us, chiefly from the exceeding ductile materials of his precepts and positions, and from

the unquiet agitation of their own ingenuity, the manifold sweepings of the schools. But this their dictator is so much the more to blame than they, since even when engaged in the evident things of history, he brought back the darkest idols of some subterranean den; and erected even upon the history itself of particular things certain works as of spiders, which he wished to seem causes, whereas they are utterly without strength or value. Such also in our times hath Geronimo Cardano constructed, both at variance with things and with himself. Yet augur not, my son, that while I entertain this opinion against Aristotle, I have conspired with his rebel, a certain Pierre Ramus. No commerce have I with this nest of ignorance, most pernicious moth of letters, who twists and presses things with the chains of his method and compendium, till the things indeed, if any there be, escape altogether and leap out; but he himself grasps the arid and most deserted trifles. And Aquinas, indeed, with Scotus and his fellows, contrived a variety of things, even when their subjects were non-entities; but this man hath, even on subjects having real existence, produced the vacuity of non-entity. And although he is such a man, yet doth he impudently talk of uses to mankind, so that even when compared with the sophists he seems to prevaricate. But let us dismiss these. And now let Plato be summoned, that polite caviller, tumid poet, insane theologian. And surely when thou wast filing and putting together I know not what philosophic rumours, and simulating knowledge by dissembling it, and tempting and loosening men's minds with vague inductions, thou mightest either have ministered discourses to the feasts of literate and polite men, or also grace and love to ordinary discourses. But when thou didst counterfeit truth, which is as it were the indigenous inhabitant of the human mind, migrating from nowhere else, and didst turn aside our minds, which are never sufficiently applied and brought back to history and to things themselves, and teach them to enter into themselves, and under the name of contemplation to wallow amid their blind and most confused idols, thou didst then commit a capital offence. And afterwards, with scarcely less naughtiness, didst thou introduce an apotheosis of folly, and dare to defend with religion thy meanest cogitations. For it is a slighter evil that thou hast been the parent of philologers, and that under thy guidance, and the auspices of thy manifold genius, ensnared and satisfied with fame and the popular and smooth jucundity of the know-

ledge of things, they did corrupt the severer investigation of truth. Among these were Marcus Cicero, and Annæus Seneca, and Plutarch of Chaeronea, and many others nowise equal to these. Let us now proceed to physicians. I see Galen, a man of the narrowest mind, a forsaker of experience, and a most vain pretender. Art not thou he, Galen, who took away even the infamy of ignorance and indolence in physicians, and put them in safety, the most sluggish definer of their art and duty? who, by declaring so many disorders to be incurable, proscribest so many of the sick, cutting off their hope and the industry of physicians. O, dogstar! O, pestilence! Eagerly seizing and displaying thy fiction of mixture, the prerogative of nature, and thy sedition between the heat of stars and of fire, deceitfully reducest human power to order, and seekest to defend for ever thy ignorance by despair. Thou art unworthy to be longer detained. Thou mayest also take away with thee thy fellows and confederates the Arabians, the framers of dispensatories, who, in theories as madly as the rest, did, more copiously indeed, from the supinest conjectures, compound the promises rather than the aids of vulgar medicines. Take also thy companions the careless crowd of moderns. Ho! Nomenclator, call them. But he replies, they are unworthy of having their names preserved by him. As, however, I recognise certain grades among triflers of this kind, the worst and most absurd sort are those who in method and accurate discussion comprehend universal art, and are usually applauded for their elocution and arrangement; such is Fernelius. Those do less harm, who display a greater variety and propriety of observations, though diluted with and immersed in the most foolish pretences; as Arnoldus de Villa Nova, and others the like sort. I perceive, on the other side, the cohort of chymists, among whom Paracelsus boasts himself above the rest; who by his audacity merits separate correction. What oracles of Bacchus dost thou pour out in thy new meteorics, thou rival of Epicurus? Yet he, as if asleep, or doing something else, did in this matter as it were commit his opinions to fate. Thou, more foolish than any fate art ready to swear to the words of the absurdest falsehood. But let us see thy other works. What mutual imitations of the fruits of thy elements? what correspondencies; what parallels dreamest thou, O fanatical joiner of idols! for thou hast made man indeed a pantomime. Yet how notable are those interpunctions, thy species

namely, by which thou hast broken the unity of nature. Wherefore I can better endure Galen weighing his elements, than thee adorning thy dreams. For the occult properties of things excite him, but thee the common and promiscuous qualities. Meanwhile, unhappy we, that dwell amid such odious impertinences! But how eagerly this most skilful impostor inculcates the triad of principles, a fiction not altogether useless, and somewhat allied to things! Hear still graver charges! By mingling things divine with things natural, profane with sacred, heresies with fables, thou hast polluted (O sacrilegious impostor!) truth, both human and religious. The light of nature (whose most sacred name thou so often usurpest with impure mouth) thou hast not hid, like the sophists, but extinguished. They were the deserters of experience, thou the betrayer. Subjecting by rule the crude and masked evidence of things to contemplation, and seeking the Proteuses of substances according to the computations of motions, thou hast endeavoured to corrupt the fountains of knowledge, and to strip the human mind; and thou hast increased with new and adscititious windings and tediousness of experiments, those to which the Sophists were averse, and the Empiricks unequal; so far art thou from having followed or known the representation of experience. And also the boastings of the Magi thou hast every where done thy utmost to amplify, forcing the most importunate cogitations by hope, and hope by promises, at once the contriver and the work of imposture. Among thy followers, Paracelsus, I envy thee none but Petrus Severinus, a man not deserving to spend his life amid such impertinences. Surely thou art much indebted to him, Paracelsus, because he rendered the things which thou (O adopted of asses) used to bray, harmonious and pleasant, by a certain melody and modulation, and most agreeable diversity of words, converting the odiousness of falsehoods into the delights of fable. Yet I pardon thee, Severinus, if, weary of the learning of sophists, which is not only fruitless, but professedly courteth despair, thou soughtest other supports for our decaying affairs. And when those pretensions of Paracelsus presented themselves, commended by the proclamations of ostentation, and the subterfuges of obscurity, and the affinities of religion, and other adornments, thou didst surrender thyself with a certain impulse of indignation to these, not fountains of things but openings of hope. Thou wouldst have acted rightly and in order, if from the maxims of ingenuity thou hadst turned to the de-

crees of nature, which would have held out to thee not only art short, but also life long. And now, having passed sentence against Paracelsus, I perceive the rest of the chymists fixed in astonishment. They immediately acknowledge his decrees, which he himself promulgated rather than established, and fortified by arrogance (plainly not after the ancient discipline), instead of caution; when, indeed, these men, reconciled to each by much reciprocation of lying, every where hold forth abundant hope, and wandering through the by-ways indeed of experience, do at times, by chance, not conduct, hit upon some things useful. Yet in their theories they (as disciples of the furnace) have not withdrawn from their art. But, as that wanton youth, when he discovered a boat upon the shore, sought to build a ship; so these coalmen, from a few experiments of distillations, have attempted to erect a philosophy, which is everywhere obnoxious to those most absurd idols of separations and liberations. Yet I count them not all alike; for as much as there is a useful sort of them, who, not very solicitous about theories, do by a kind of mechanic subtlety lay hold of the extensions of things; such is Bacon. There is a base and detestable sort, who everywhere seek applause for their theories, by religion, hope, imposture, wooing, and supplicating for it; such is Isaac Hollandus, and by far the greater part of the rabble of chymists. And now let us summon Hippocrates, the creature of antiquity and the seller of years, to whose authority, when both Galen and Paracelsus with much zeal strive to betake themselves, as to the shadow of the ass, who bursts not into laughter? And truly this man seems to cling to experience with perpetual steadfast looking, yet with eyes not moving and inquiring, but stupid and enfeebled. Afterwards, his sight recovering somewhat from the stupor, he receives certain idols, not indeed those huge idols of theories, but the more elegant which encompass the superficies of history; on swallowing which swelling, and half a sophist, and (after the manner of his age) sheltered by brevity, he at length (as these two think) sets forth his oracles, of which they seek to be esteemed the interpreters; while in reality he does nothing but either deliver certain sophistications in sentences abrupt and suspended, thus withdrawing them from confutation; or invest with stateliness the observations of rustics. And nearest (as is commonly believed) to his precepts, which are not so unsound as useless, approaches Cornelius Celsus, but a more intense sophist, and more

bound to history modified, sprinkling the same moral moderation upon the progress of knowledge, and amputating the extremes of error, not rooting out the principles. And regarding these, what we have said is most true. But I now hear thee, my son, inquiring whether perhaps, as is done, they have not sought after the worst parts, especially as the state of knowledge is always almost democratic? Hath not time, like a river, brought down to us the light and inflated, and sunk the solid and weighty; What of those ancient inquirers after truth, Heraclitus, Democritus, Pythagoras, Anaxagoras, Empedocles, and others, known by the writings of others, not by their own? Lastly, what deem you of the silence and the secrets of antiquity? My son, (that I may answer these inquiries, as is usual with me, for thy benefit), I recognize a few fragments of antiquity (of books found I speak not), yet these as specimens rather of the diligence and ingenuity than the knowledge of their authors. But if I hint that those searchings of conjectures respecting things, which with their footsteps have fled away, are laborious; and that for me, studying the utility of mankind for time coming, it were unfitting to turn back to the philology of antiquity, I know sufficiently that in thy modesty thou wouldst acquiesce. Nevertheless that thou mayest perceive what two-faced prophets things present are, and how they bring before us things both past and future, I have resolved to gratify thee with tables of both times (which may comprise not only the courses and flowings of knowledge, but also other provisions of things). And do not augur what this may be (before seeing it), for the true anticipation of this matter falls not to thee, and if it come not to thy hand, seek it not. For in this matter, my son, I shall gratify some of you, and conciliate the minds of the more delicate. Knowledge indeed is to be sought from the light of nature, not recovered from the obscurity of antiquity. Nor is it of importance what may have been done; we have only to see what can be done. If a kingdom, subdued by arms and victorious war, were delivered to thee, wouldst thou frame questions whether or not thy ancestors had possessed it, and solicit the rumours of genealogies? So much for the recesses of antiquity. But concerning those leaders of sects, whom thou hast named, and many more of like sort, it is easy to decide. Variety is proper to error, unity to truth. And unless the politics and provisions of the times had been adverse to the peregrinations of such minds, many other regions of error

would have been wandered over. For an immense ocean encompasses the island of truth; and men have still to endure new damages and scatterings from the winds of idols. Nay, even two or three days ago Bernardinus Telesius mounted the stage, and enacted a new play, neither frequent in applause, nor elegant in argument. Dost thou not observe, my son, that the contrivers both of eccentrics and of epicycles, and the charioteers of the earth, delight in the impartial and ambiguous advocation of phenomena? It is exactly so in universal theories. For as if any one, knowing only the use of his vernacular tongue, (attend, my son, for this is very similar), undertake to write an unknown speech, in which, observing some few words approaching in sound and letters to those of his own language, he immediately and confidently assumes them to be of the same signification (though more frequently far removed from it); then, by collating these together, with much labour of ingenuity but also much liberty, he divines the remaining sense of the oration; altogether such also are those interpreters of nature found to be. For each bringing his idols (I speak not now of those of the stage, but especially of the market and of the den), like diverse vernacular tongues, to history, immediately seizes the things which sound somewhat alike; from the symmetry of these the rest are interpreted. And now it is time, my son, for us to recover and purge ourselves, seeing we have been handling (though with purpose of importing) things so profane and polluted. But against all these I have said less than their guilt deserved. Yet perhaps thou comprehendest not this censure. For be assured, my son, the judgment I have pronounced against them is nothing less than contumely. For I have not conducted myself like Velleius with Cicero, a declaimer and philologist cursorily touching opinions, and rather casting them away than destroying them; or like Agrippa the modern, in speech of that kind not to be named indeed, but a trivial buffoon, distorting every thing and holding it out to ridicule (unhappy me who in defect of men am forced to compare myself with brutes!). But on looking back afterwards thou wilt discern, under the veil of reproach, wondrous airs of accusations, with singular art contracted and reduced almost to single words, and with keenest glance directed and brandished against the very ulcers themselves of offence. And when they might have been much mingled and entangled together in their crimes and guilt, I have by their most pecu-

liar marks, but those capital, condemned them singly. For the human mind, my son, puffed up with the incursions and observations of things, contrives and educes very various species of error. But Aristotle is as a taller plant of one species, so also Plato, and others besides. Yet thou requirest particular confutations. Verily it were a great sin against the golden fortune of mankind, the pledge of empire, for me to turn aside to the pursuit of most fleeting shadows. One bright and radiant light of truth, my son, must be placed in the midst, which may illuminate the whole, and in a moment dispel all errors. Certain feeble and pale lamps are not to be carried round to the several corners and holes of errors and falsehoods. Wherefore, my son, detest what you were seeking; for it is very profane. But now I hear thee asking: Is all that the whole of these have asserted altogether false and vain? Truly, my son, this is unhappiness and that prodigious, not ignorance. For no man does not at times hit upon something true. When Heraclitus remarked, that knowledge is to be sought by men in private worlds, not in the common world, I perceive that he sacrificed well at the entrance of philosophy. Democritus, I think, did not unhappily philosophize, when attributing immense variety and infinite succession to nature, he set himself against almost all other philosophers, the slaves of custom, and given over to secularities, and by this opposition bringing both errors into collision, destroyed both, and opened some way for truth between the extremes. The numbers of Pythagoras I set down as also of good omen. Dindamus the Indian I commend, for having called custom antiphysis. And to Epicurus disputing against the explication of causes (as they speak) by intentions and ends, though childishly and philologically, I nevertheless not unwillingly listen. Pyrrho also and the vacillating academics, talking from the skiff, and conducting themselves against idols like certain morose lovers (who are always reproaching their loves, but never desert them), I use for the sake of the mind and of hilarity. Nor without cause: for idols drive others straight forwards, but these in a circle, which is pleasanter. Lastly, I should wish to have Paracelsus and Severinus for criers, when with such clamours they convoke men to the suggestion of experience. What then? Are they possessed of truth? Nothing less. And, my son, some proverbs of rustics are apposite to truth. If the sow with her snout should happen to imprint the letter A upon the ground;

wouldst those therefore imagine that she could write out a whole tragedy as one letter? Of a far different sort is the truth revealed from the analogy of knowledge, and the truth from the section of an idol. The former is constant and indefinitely germinous, the latter discordant and solitary. Which happens also in works. Gunpowder, if it had been invented by conduct, not chance (as they speak) and accident, would not have come forth solitary, but with great frequence of noble inventions (which fall under the same meridian). So also the rest both works and principles. Wherefore I admonish thee, if perhaps any idol of any of these hath in any point determined my truth, that is, the truth of things, not to think more highly of them, or less of me, since it is sufficiently apparent from their ignorance of the rest, that those things themselves they have not said from the analogy of knowledge. But thou still urgest, my son: would you therefore order all their writings to be converted into wrappings for incense and perfumes? That I should not have said. For there remains yet a short while some use of them, slight and narrow, and far different from that which they were destined for, and now usurp, but still some. Add to this that there are many other writings obscurer in fame, but more excellent in use. The morals of Aristotle and of Plato many admire; yet Tacitus breathes more living observations of manners. But at length in the proper place I shall say, what utility can be derived from writings, and which are superior in utility to the rest, and which smallest part of them are gifts of those things which contribute to the interpretation of nature. Lastly, my son, I hear thee inquiring: dost thou suffice thyself in place of all these? I shall reply, and that not dissemblingly, but from my inmost sense. I, dearest son, will confirm to thee a sacred, chaste, and legitimate marriage with things themselves. From which intercourse (above all wishes of marriage songs) thou shalt beget a most blessed progeny of heroes, who shall subdue the infinite necessities of man, more fatal than all giants, and monsters, and tyrants; and for your affairs procure a placid and festal security and plenteousness. But were I, my son, to commit thee to the giddy intricacies of experience with a mind unpurged of idols, verily thou wouldst soon desire a leader. Yet by my simple precepts without the knowledge of things, thou canst not, however much thou mayest wish it, divest thyself of idols. In tables, unless you erase what has before been written, you can write nothing else. But in the mind, on the contrary, un-

less you incribe something else, you cannot erase what has before been written. And although this may be done, although thou mayest put off the idols of friendship, yet indeed, being uninitiated, there is danger that thou mayest be overwhelmed by the idols of the way. Thou hast too much accustomed thyself to a leader. At Rome, tyranny being once established, the oath in the name of the Roman senate and people was ever afterwards vain. Confide and give thyself to me, my son, that I may restore thee to thyself.

OF THE INTERPRETATION OF NATURE.

ACCOUNTING myself born for the use of mankind, and judging the case of the commonweal to be one of those things which are of public right, and like water or air lie open to all; I sought what might be of most advantage to men, and deliberated what I was most fitted for by nature. I discovered that nothing is of such estimation towards the human race, as the invention and earnest of new things and arts, by which man's life is adorned. For I perceive that, even in old times among rude men, the inventors and teachers of things rude were consecrated and chosen into the number of the gods; and I noted that the deeds of heroes who built cities, or were legislators, or exercised just authority, or subdued unjust dominations, were circumscribed by the narrowness of places and times. But the invention of things, though it be a matter of less pomp, I esteemed more adapted for universality and eternity. Yet above all, if any bring forth no particular invention, though of much utility, but kindleth a light in nature, which from the very beginning illuminates the regions of things, which lie contiguous to things already invented, afterwards being elevated lays open and brings to view all the abstrusest things; he seems to me a propagator of the empire of man over the universe, a defender of liberty, a conqueror of necessities. But I found myself constructed more for the contemplations of truth than for aught else, as having a mind sufficiently mobile for recognizing (what is most of all) the similitude of things, and sufficiently fixed and intent for observing the subtleties of differences, and possessing love of investigation, patience in doubting, pleasure in meditating, delay in asserting, facility in returning to wisdom, and neither affecting novelty, nor admiring antiquity, and hating all imposture. Wherefore I judged my nature to have a kind of familiarity and relationship

with truth. Yet seeing by rank and education I was trained to civil affairs, and, like a youth, sometimes staggered in my opinions, and conceived I owed my country something peculiar, and not equally pertaining to all other parts, and hoped, if I obtained any honourable degree in the commonwealth to perform with greater help of ingenuity and industry what I had intended; I both learnt civil arts, and with all ingenuousness and due modesty, commended myself to my friends who had some power. And in addition to this, because those things of whatever kind penetrate not beyond the condition and culture of this life, the hope occurred that I, born in no very prosperous state of religion, might, if called to civil offices, contribute somewhat to the safety of souls. But when my zeal was imputed to ambition, and my age was matured, and my disordered health also admonished me of my unhappy slowness, and I next considered that I nowise fulfilled my duty, while I was neglecting that by which I could through myself benefit men, and applying myself to the things which depended upon the will of another, I altogether weaned myself from those thoughts, and wholly betook myself to this work, according to my former principle. Nor is my resolution diminished, by foreseeing in the state of these times, a sort of declination and ruin of the learning which is now in use; for although I dread not the incursions of barbarians (unless, perhaps, the empire of Spain should strengthen itself, and oppress and debilitate others by arms, itself by the burden), yet from civil wars (which, on account of certain manners not long ago introduced, seem to me about to visit many countries), and the malignity of sects, and from those compendiary artifices and cautions which have crept into the place of learning, no less a tempest seems to impend over letters and science. Nor can the shop of the typographer suffice for those evils. And that unwarlike learning, which is nourished by ease, and flourishes by praise and reward, which sustains not the vehemency of opinion, and is the sport of artifices and impostures, is overcome by the impediments which I have mentioned. Far different is the nature of the knowledge whose dignity is fortified by utility and operation. And from the injuries of time I am almost secure; but for the injuries of men I am not concerned. For should any say that I savour things too high, I reply simply, in civil affairs there is place for modesty, in contemplations for truth. But if any one require works immediately, I say, without any imposture, that I, a man not old, frail in health, in-

volved in civil studies, coming to the obscurest of all subjects without guide or light, have done enough, if I have constructed the machine itself and the fabric, though I may not have employed or moved it. And with the same candour, I profess that the legitimate interpretation of nature, in the first ascent before arriving at a certain degree of generals, should be kept pure and separate from all application to works. Moreover, I know that all those who have in some measure committed themselves to the waters of experience, seeing they were infirm of purpose, or desirous of ostentation, have at the entrance unreasonably sought pledges of works, and have thence been confounded and shipwrecked. But if any requires at least particular promises, let him know that by that knowledge, which is now in use, men are not skilled enough even for wishing. But, what is of less moment, should any of the politicians, whose custom it is from personal calculations to estimate every thing, or from examples of like endeavours to form conjecture, presume to interpose his judgment in a matter of this sort, I would have told that ancient saying, " claudus in via, cursorem extra viam antevertit," and not to think about examples, since the matter is without example. But the method of publishing these things is, to have such of them as tend to seize the correspondences of dispositions, and purge the areas of minds, given out to the vulgar and talked of; to have the rest handed down with selection and judgment. Nor am I ignorant that it is a common and trite artifice of impostors to keep apart from the vulgar certain things which are nothing better than the impertinences they set forth to the vulgar. But without any imposture, from sound providence, I foresee that this formula of interpretation, and the inventions made by it, will be more vigorous and secure when contained within legitimate and chosen devices. Yet I undertake these things at the risk of others. For none of those things which depend upon externals concerns me: nor do I hunt after fame, or, like the heretics, take delight in establishing a sect; and to receive any private emolument from so great an undertaking, I hold to be both ridiculous and base. Sufficient for me is the consciousness of desert, and the very accomplishment itself of things, which even fortune cannot withstand.

J. A. C.

TRUE HINTS ON THE INTERPRETATION OF NATURE.

The First Part of this Tract forms the Preface to the Novum Organum, Vol. IX. p. 185—190, *translated by Mr. Wood, Vol. XIV. p.* 27—30.

OUTLINE AND ARGUMENT OF THE SECOND PART OF THE INSTAURATION.

KEEPING then in view our plan, we shall exhibit the whole subject perspicuously, and with orderly distribution of the parts. Wherefore let us now unfold the design and arrangement of this second part. We devote this part to the doctrine of a better and more perfect use of reason than hath heretofore been known or promulgated to men, with purpose (as far as the terms of this mortal state permit) to aggrandize and enlarge the human intellect with power to conquer and interpret the mystery of nature. To the interpretation itself we have dedicated three books, the third, the fourth, and the fifth; for the sixth, which consists of anticipations drawn from the ordinary use of reason, it is to be taken only as temporary and provisional, and when in time it shall have begun to acquire solidity, and to be verified by the methods of legitimate reason, it is shifted, and as it were migrates of itself into the sixth.

But to this second book is apportioned the intellect itself, its treatment and regulation, and the entire system of preparation and training leading to the right conduct of the understanding. And although the term logic or dialectics, by reason of the depravations of the art, sounds repulsive in our ears, yet to lead men as it were so far by the hand in their wonted tracks, we acknowledge the art which we profess to be of the nature of logic,—so far as logic, (the common logic I mean), supplies aids and constructs defences for the intellect. Yet ours differs from the received logic, besides other points of opposition, principally in three; namely, its mode of entering on inquiry, its order of demonstration, and its end and office. It goes deeper to find

a foundation and basis for inquiry, by subjecting to investigation what the received logic admits as it were on the credit of others, and in a blind submission to authority, principles, primary notions, and the informations of the senses; and it reverses downright its order of demonstration, by making propositions and axioms, in an unbroken line, ascend and mount on a ladder of elevation, from recorded facts and particular experiments to generic verities, not by darting without a pause to principles and the higher generalizations, and from them deducing and inferring intermediate truths. Again, the end of this our scheme of science is, that things and works, not reasonings and speculative probabilities, may be invented and brought to the test.

Such then is the scope of the second book. Let us now, in like manner, set forth its arrangement. As in the generation of light it is requisite that the body which is to receive the rays be made smooth and clean, and then planted in a position or conversion duly adapted to the illumination, before the light itself is introduced, even so we must proceed now. For first the area of the mind must be levelled out and cleared of those things which have hitherto encumbered it; next, there must be a turning of the mind well and fittingly to the objects which are presented; lastly, information must be exhibited to the mind thus prepared for its reception.

Now the extirpating part is threefold, according to the three several classes of idols which beset the mind. For such idols are either adoptive, and that in two ways, having invaded and established themselves in the mind from the systems and sects of philosophy, or from an abuse of the laws and methods of demonstration; or secondly, they are such as are inseparable from and indigenous in the essence of the mind. For as an uneven and ill cut mirror distorts the true rays of things according to its own incurvation of surface; so, too, the mind, subjected to the impression of objects through the senses, in performing its operations, interchanges and mixes up its own nature with that of its objects, so as it may not be implicitly trusted.

Wherefore the first task imposed upon us is to disperse utterly, and to expatriate all that army of theories which has figured in so many well fought combats. To this we add a second, the emancipation of the mind from the slavery imposed on it by perverted laws of demonstration; which is followed by a third, namely, to master the seductive bias

of the mind itself, and either to extirpate its native idols, or if they cannot be rooted up, so to point them out and thoroughly comprehend them, that deviations may be rectified. For it would be futile, and perhaps pernicious, merely to overturn and explode errors in philosophy, if from the incorrigible grain of the mind a new off-shoot of errors, perhaps even degenerated from their predecessors, should sprout; and not till all hope is precluded, of perfecting philosophy or enlarging its empire by the exercise of ordinary reason, and by the helps and aids of the received logic, ought we to abandon and discard them; lest haply we do not thereby banish, but only change our errors. Wherefore that part of the book which we term the destroying, consists of a threefold argument of redargution or exposure; redargution of the philosophies; redargution of the demonstrations; and redargution of human reason in its natural course.

And it does not escape us, that without so immense a revolution, no small accretion to science might result from our labours, and celebrity be attainable by a smoother path. Nevertheless, being uncertain when the same views may enter the mind of any other man, we have determined to make a full and free profession of our creed.

After having levelled the area of the mind, it follows in order, that we must place the mind in an advantageous position, and, as it were, in a kindly exposure to the rays of what we propound. For since, in a matter of novelty, not merely the violent preoccupation of old opinion, but also a false preconception or conjectural picture of that which is offered, disposes to prejudice, we must also apply a remedy to this disorder, and the mind must not only be disencumbered but prepared. That preparation is nothing more than to have true opinions of that which we allege imparted provisionally only, as it were, and by way of loan, previous to a thorough knowledge of the thing itself. Now this mainly depends on shutting out and holding in abeyance those foul and malign suspicions, which we may easily augur, will from the prejudices now in vogue, as from the contagion of an epidemic fanatical gloom, seize upon men's minds; wherefore it behoves us to see, as Lucretius hath it,

> "Ne qua
> Occurrat facies inimica atque omnia turbet."

First then, if any one think that the secrets of nature remain shut up, as it were, with the seal of God, and by

some divine mandate interdicted to human wisdom, we shall address ourselves to remove this weak and jealous notion, and, relying on simple truth, shall bring the inquiry to this issue, not only to silence the howl of superstition, but to draw religion herself to our side. Again, if the idea should occur to any one, that great and scrupulous delay in experiments, and the tossing about, so to speak, on a sea of matter and particular facts, which we impose on men, must needs plunge the mind into a very Tartarus of confusion, and cast it down from the serenity and coolness of contemplative wisdom, as from a far diviner state,—we shall show and establish, as we trust, for ever, (not without putting to the blush the whole of that school which hesitates not to concede divine, honours to fantastic reveries utterly bereft of solidity), the difference that prevails between the ideas of the divine and the idols of the human mind. Those also to whom, absorbed in the love of meditation, our frequent mention of works sounds harsh, uncouth, and mechanical, shall be instructed how much they war against the attainment of their own object of desire, since exact clearness of contemplation, and the invention of works its underplatform, depend upon and are brought to perfection by the same means. If any one should still hold out, conceiving of this absolute regeneration of science from its elements, as a thing interminable, vast, and infinite, we shall demonstrate that, on the contrary, it ought to be regarded as a true boundary and a circumscribing line, marking off the region of error and waste land; and we shall make it manifest, that a just and full inquisition of particulars, without attempting to embrace individuals, gradations, and vermiculate differences (which is enough for the purposes of science); and then notions and truths, raised from and upon the former, in just method, form something infinitely more defined, tangible, and intelligible, sure of itself, and clear both in what hath been done, and what remains to be accomplished, than floating systems and abstract subtleties, of which there is indeed no end, but a ceaseless gyration, whirl, and chaos. And though some sober censor (as he may think himself), applying to this subject that diffidence of consequences which becomes civil prudence, should consider what we now say to be like men's vain aspirations,—an indulgence only of wild hope,—and that in truth nothing else will follow from this remodelled state of philosophy, than that new doctrines, perhaps, are substituted, but the resources of mankind not at all augmented,—such a one we shall, as

we conceive, induce to admit, that we are doing any thing but founding a system or a sect, that our institution differs wholly and generically from all that have hitherto been attempted in philosophy and the sciences,—and that there is the surest promise of a harvest of works, if men will only not forestal the same by hastening to cut the first worthless vegetation of muscus and weeds, and grasping with a childish passion and vain precipitation at the first pledges of works. And in handling the points we have enumerated, enough, we think, shall have been done to guard against that species of prejudice which is inspired by false and illiberal notions of the thing propounded; and therewithal we judge that our second part, which we call the preparatory, is complete;—after every adverse gust from religion, from theoretical speculation, and from civil wisdom, with its handmaids, distrust, phlegmatic coldness, and the like, shall have sunk and died away.

Yet to form a preparation in all respects perfect, it seems still to be wanting, that we remove the stagnation of mind, which is generated by the utter novelty of our plan. This unfriendly torpor is only dispelled by the explanation of its causes; for it is the knowledge of its causes alone that solves the prodigy, and puts an end to the stupor of astonishment. Wherefore we shall here note all those perverse and troublesome obstacles by which true science hath been checked and retarded, so that it is not at all astonishing that men should have been so long involved, and toiled on, in the meshes of error.

And in this part of the subject one thing will felicitously come in, as a solid reason for hope, namely, that although the true interpretation of nature, wherein we toil, be justly held most difficult, yet by far the greatest part of that difficulty depends upon what lies within our own power and admits of correction, not on things placed beyond our sphere of capacity; I mean in the mind, not in things, or in the senses.

Now if any one deem that scrupulous care with which we strive to prepare men's minds is uncalled for,—that it is of the nature of parade, and got up for purposes of display, and should therefore desire to see denuded of all circumlocution and the scaffolding of preliminaries, a simple statement; assuredly such an insinuation, were it founded in truth, would come well recommended to us. Would that it were as easy for us to conquer difficulties and obstructions,

as to cast away idle pomp and false elaboration. But this we would have men believe, that it is not without due exploration of the route, that we pursue our path in such a desert, especially having in hand such a theme, as it were monstrous to lose by incompetent handling, and to leave exposed, as by an unnatural mother. Wherefore, duly meditating and contemplating the state both of nature and of mind, we find the avenues to men's understandings harder of access than to things themselves, and the labour of communicating not much lighter than of excogitating; and, therefore, which is almost a new feature in the intellectual world, we obey the humour of the time, and play the nurse, both with our own thoughts and those of others. For every hollow idol is dethroned by skill, insinuation, and regular approaches; whereas by violence, by opposition, and by irregular and abrupt attacks, it is exasperated into energy. Nor does this take place only because men, enslaved by admiration of certain authors, or bloated with self-sufficiency, or reluctant from some habit, will not exert their candour. Even were any one willing in the utmost degree to exact of himself impartiality as a duty, and to forswear as it were every prejudice, it does not follow that we are to repose unlimited confidence in the award of a mind so disposed. For no man by mere energy of will commands his intellect, the spirits of the philosophers (as it is written of the prophets) are not subject to the philosophers. Wherefore it is not the honesty, candour, or openness to conviction of other men, which we are to confide in for support, but our own care, address, and conciliation.

In which respect no small difficulty is further created to us from our own character, having laid it down as an inviolable law evermore to hold fast our integrity and ingenuousness, and not to seek an entrance for truth through hollow ways, but so to regulate our compliance as by no subtle deception, by no imposture or ought that resembles imposture, but only by the light of order and the skilful grafting of new shoots upon the healthier part of the old, to hope for the attainment of our desires. Wherefore we return to this assertion, that the labour consumed by us in paving the way, so far from being superfluous, is truly too little for difficulties so considerable.

Leaving, therefore, the preparatory part, we now come to the informing, and shall exhibit a simple and bare outline of that art which we intend.

The things which make for the perfecting of the intellect in the interpretation of nature, may be divided into three ministrations to the same, ministration to sense, ministration to memory, and ministration to reason. In ministration to the senses we shall make exposition of three things, first, how a good notion is collected and elicited, and how the testimony of sense, which is ever according to the analogy of man, may be reduced and rectified to the analogy of the universe. For we do not attach much weight to the immediate perceptions of sense, except only in so far as it manifests motion or change in its objects. Secondly, we shall show how those things which baffle the sense, either by intangibility of the entire substance, or by minuteness of parts, or by remoteness of place, or by slowness or celerity of motion, or by habitual familiarity of the object, or otherwise, may be brought under the jurisdiction of sense, and placed at its bar; and, furthermore, in cases where they cannot be produced, what is then to be done; and how such deficiency may be filled up by skilful noting of gradations, or by informations as to inanimate bodies derived from the analogy of corresponding sentient ones, or by other modes and substitutions. In the last place, we shall speak of a Natural History, and the method of performing experiments; what that Natural History is, which will serve as a foundation for philosophy; and again what method of experimenting, in the want of such natural history, must be resorted to; wherein we shall also interweave some observations as to calling forth and arresting the attention. For there are many things both in natural history and in experiments, present to knowledge, absent to use, because the apprehensive faculty hath been feebly drawn forth to note them.

Ministration to the senses is comprehended in three particulars. The senses are to be furnished with materials, with helps where they *fail*, and helps where they *err*. To the materials of the senses are appropriated history and experiments, to their short-comings fit substitutions, to their declination rules of correction.

Ministration to memory hath this for its function; out of the mass of particular facts, and the accumulation of facts forming natural history general, it extracts a history particular, and arranges it in such order, that the judgment can forthwith act, and do its office. For it befits us prudently to calculate the powers of the mind, and not to hope that they can expatiate at large over the infinity of nature. For it is manifest that the memory is defective and incom-

petent when it attempts to embrace the endless variety of things, and, no less, that in the choosing out of such as bear on some defined field of inquiry, it is unpractised and unprepared. Now, as regards the former malady, the mode of curing it is easy. It is performed by one remedial rule, which is that no investigation or invention be entertained which is not drawn from a written statement of results. For it were the same for one confident in the strength of memory to try to grasp the whole interpretation of nature on a given subject, as to endeavour to seize and perform by rote the problems of astronomy. Besides it is sufficiently apparent how small is the province we allot to mere memory or discourse of reason, seeing we do not authenticate discovery, even when detailed in writing, save by digested tables. To the latter defect, therefore, we must devote more attention. And, doubtless, after the subject has been measured off and defined for inquiry, and stands clear and unencumbered out of the mass of things, the ministration to memory seems to consist of three operations or offices. First, we shall show what those things are which, in regard to the subject given or propounded seem, on glancing over its history of facts, the proper points for inquiry, which forms a kind of argument or topic. Secondly, in what order these ought to be marshalled, and digested in regular tables. Nevertheless, we expect not that the true vein of the subject, being of the analogy of the universe, can be discovered at the outset of the inquiry, so that the division might follow from it, but only the apparent one, so as to suggest some sort of partition of the subject. For truth shall sooner emerge from falsehood than from disorder, and reason more easily rectify the division, than penetrate the unsubdued mass. Then, in the third place, we shall show in what method and at what time the inquisition is to be recommenced, and the charts or tables preceding to be brought forward to new charts, and how often the inquisition is to be repeated. For we intend the first series of charts or results to form as it were moveable axes, and to constitute only the verifying part of the inquisition; for we have no hope of the mind's ever pursuing and securing its rightful dominion over nature, unless by repeated action. The ministration, therefore, to memory consists as we have said in three doctrines, of the topics of discovery, of the reduction into tables, and of the method of fully establishing the inquiry.

Ministration to reason remains, to which the two former

parts are only ancillary. For by them there is no building up of axioms, but only the production of simple notions with an orderly narration of facts, verified, indeed, by the first ministration, and so exhibited by the second, as to be, so to speak, placed at our disposal. Now that ministration to reason claims to be most highly approved, which shall best enable reason to perform its office and secure its end. The office of reason is in its nature one, in its end and use double. For the end of man is either to know and contemplate, or to act and execute. Wherefore the design of human knowledge is to know the causes of a given effect or quality in any object of thought. And again the design of human agency is, upon a given basis of matter, to build or superinduce any effect or quality within the limits of possibility. And these designs, on a close examination and just estimate, are seen to coincide. For that which in contemplation stands for a cause, in operation stands for a mean, or instrument; since we know by causes and operate by means. And doubtless if all the means which are required, to what operations soever, were supplied to man's hand at pleasure, there would be no especial use in treating of the two disjunctively. But since man's operation is tied up within much narrower circumscription than his knowledge, because of the innumerable necessities and limitations of the individual, so that for the operative part there is often demanded not so much a wisdom all-comprehensive and free to range over possibility, as a judgment sagacious and expert in selecting from what is immediately before us; it is consistent with this, to consider these things as more happily treated of apart. Wherefore we shall also make like division of the ministration to reason, according as the ministration is to reason active or contemplative.

As respects the contemplative part, to say it in a word, all evidently turns on one point. And that is no other than this, that a true axiom be established, or the same be made conjunctive with other axioms, for this is gaining a portion of the solid of truth, whereas a simple notion isolated, is so to speak but its surface. Now such axiom is not elicited or formed, save by the legitimate and appropriate forms of induction, which analyses and divides experience, and by proper limitations and rejections comes to necessary conclusions. Now the popular induction (from which the proofs of principles themselves are attempted) is but a puerile toy, concluding at random, and perpetually in risk of being exploded by contradictory instances: inso-

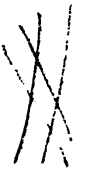
much that the dialecticians seem never once to have thought of the subject in earnest, turning from it in a sort of disdain, and hurrying on to other things. Meantime this is manifest, that the conclusions which are attained by any species of induction are at once both discovered and attested, and do not depend on axioms and middle truths, but stand on their own weight of evidence, and require no extrinsic proof. Much more then is it necessary that those axioms which are raised according to the true form of induction, should be of self-contained proof, surer and more solid than what are termed principles themselves; and this kind of induction is what we have been wont to term the formula of interpretation. Therefore it is, that we desire to be careful and luminous, in exposition, above all other topics, of the construction of the axiom and the formula of interpretation. There remain, however, subservient to this end, three things of paramount importance, without explication of which, the rule of inquisition, though potent in the effect, may be regarded as operose in the application. These are the *continuing*, *varying*, and *contracting* of the inquiry, so that nothing may be left in the art either half-done, or inconsistent, or too much lengthened out for the shortness of man's life. We shall therefore show in the first place the use of axioms (supposing them discovered by the formula,) for inquiring into and raising others higher and more general, so that by a succession of firm and unbroken steps in the ladder of ascent, we may arrive at the unity of nature. In this part, however, we shall add the mode of examining and attesting these higher axioms by the experimental results first obtained, lest we again fall down to conjectures, probabilities, and idol-systems. And this is the method which we term the *continuing* of the inquiry.

The *varying* of the inquisition accommodates itself to the different nature, either of the causes to ascertain which the inquiry is set on foot, or of the things or subjects about which the inquiry is occupied. Therefore discarding final causes, which have hitherto utterly vitiated natural philosophy, we shall commence with an inquiry, on the plan of varying and adaptation, into forms, a branch which has hitherto been abandoned as hopeless and not unreasonably. For no one can be so privileged either in his powers of mind or in his good fortune, as to detect the form of any thing by means of presumptive conjectures and scholastic logic. Then follow the divers sorts of mat-

ter and of efficients. Now when we use the terms matter and efficients, we do not point to ultimate efficients, or to matter taken generically (such as are discussed in the disputations of the schools), but to proximate efficients and preparations of matter. Lest men should labour in these, however, by a vain repetition and refining of experiments, we shall in this part introduce the doctrine of discovering latent processes. Now we give the name of latent process to a certain series and gradation of changes, formed by the action of an efficient and the motion of parts in matter subjected to that action. The varying of the inquiry as it respects its subjects is derived from two states of things, either from their elementary or compound character, (for there is one modification of the inquiry adapted to things simple, another to things compound, or decomposed, or ambiguous), or from the copiousness or poverty of the natural history which may have been collected to advance the inquiry. For when the history is rich in facts the progress of the inquisition is prompt; when limited, it is labour in shackles, and demands manifold assiduity and skill. So then by handling the points we have now recounted, we shall have, as it seems to us, sufficiently discussed the varying of the inquiry.

There remains the *contracting* of the inquiry, so as not only to demonstrate and make patent a way in places pathless before, but a short cut in that way, and as it were a straight line of progression, which shall go direct through circuitous and perplexed routes. Now this (like every other kind of abridging) consists mainly in the selection of things. And we shall find that there are in things two prerogatives, so to speak, of sovereign efficacy in abridging investigation, the prerogative of the instance, and the prerogative of that which is inquired into. Wherefore we shall point out in the first place what those instances or experiments are, which are privileged above the rest to give forth light, so that a few of them afford as much weight as a multitude of others. For this both saves accumulation of the history and the toil of beating about indefinitely. We shall then expound what are the subjects of inquisition, from which the investigation ought to borrow its prelibation of omens; as those which being first disposed of, carry, as it were, a torch before their successors, either by reason of their own consummate certainty, or generic quality, or from their being indispensable to mechanical trials. And here we close the ministration to reason regarded in its character of contemplative.

The doctrine of the active part of reason and its ministration, we shall comprehend in three directions, first premising two admonitions to open an entrance into the minds of men. The first of these is, that in the inquiry, proceeding according to the formula laid down, the active part of reason should have a perpetual intercommunion with the contemplative. For the nature of things constrains that the propositions and axioms inferred and trained down to particular and practical uses, by process of reasoning, should yield only a sort of guesses exceedingly obscure and imperfect. Whereas an axiom drawn from particulars to new and corresponding ones, leads on investigation in a broad and indestructible path. The other premonition is this, that we remember that, in the active branch of the inquiry, the business is to be accomplished by means of the ladder of descent, the use of which we waived in the contemplative. For every operation is occupied about individual experiments whose place is at the bottom of all. We must therefore descend the steps that lie between general truths and these. Nor, again, is it practicable to get at these by means of axioms taken unconnectedly; for every practical operation, and the mode of performing it, is at once suggested and effected by applying a combination of isolated axioms. With these preliminaries then, we come to our threefold exposition of the doctrine of active interpretation. The first part propounds a defined and appropriate method of inquiry, in which not the cause or governing axiom, but the effecting of any operation is the object in view, and is submitted to examination. The second shows the way of making general tables with a special view to practice, in which may be much more easily and readily found all sorts of suggestions and indications of works. The third subjoins a mode of ascertaining and striking out new practical uses, an incomplete mode no doubt, and yet not without utility, which travels from one experiment to another, without deducing of axioms. For as from axiom to axiom, so from experiment to experiment, there is presented and opened up a passage to discovery, narrow indeed and slippery, yet not to be wholly passed over in silence. And here we conclude the ministration to practice being the last in the order of distribution. This then is a plain and succinct abstract of the second book.



These things being unfolded, we trust to have well constructed and furnished withal, the marriage chamber of mind and the universe, the divine goodness not disdaining

to be bridemaid. Let it then be the votive part of the nuptial hymn, that from their union may rise and descend a progeny of helps to man's life, a line, so to speak, of heroes to conquer and command the wants and the miseries of humanity.

At the conclusion we shall add some remarks on the combination and the succession of scientific efforts. For then, and not till then, shall men know their own strength, not when multitudes devote themselves as now to the same tasks, but when some shall appropriate what is neglected by the rest. Nor truly have we abandoned hope of after-times, that there shall rise up men to advance to a nobler state a work commencing from such slender beginnings. For it is borne in upon our mind, that what is now done, from the supreme importance of the good it contains to man, is manifestly of God. And in His workings, every the most insignificant germ of the future is pregnant with results.

Now in the redargution of the received philosophies which we intend, we scarcely know whither at first to turn ourselves, since the avenue to confutation of the same, which was to others open, is to us inhibited. And besides, so many and so vast are the troops of error which present themselves, that we must overthrow and dislodge them, not in close detail but in mass: and if we would draw near unto them, and try conclusions, hand to hand, with each of them individually, it were in vain: the rule of all reasoning being set aside, differing as we do from them in our principles, and repudiating as we do the very forms and authority of their proofs and demonstrations. And if (which seems to be the only thing left for us to do) we attempted to infer and derive from experience the truths we maintain, we are only turning back to the starting point. And forgetting what we have discoursed of the preparing of men's minds, we are found going directly the opposite way: and falling all at once and prematurely on nature; to which we have pronounced it absolutely necessary that we open up and pave a way, because of the obdurate prejudices and impediments of the minds of men. Nevertheless we shall not be wanting to ourselves, but shall try to confront them, and prove our strength, in manner accommodated to our design, both by producing certain tokens from which an estimate may be formed of these philosophies, and meanwhile noting among the philosophies themselves, so as to shake their authority, certain

prodigies of perversion, and laughing-stocks to intelligence, which they furnish.

Yet it escapes us not that the mass of such errors is too much consolidated to be at once overthrown; especially as among learned men, it is no unusual or unheard of arrogance, wilfully to reject opinions which they cannot shake. Nor shall we offer aught too light or low for the grandeur of the interest which is at stake, nor in this sort of redargution attempt to make converts to our creed, hoping only meantime to conciliate patience and candour, and that only in minds of a more commanding and decisive order. For no one can betake himself to us, fresh from the habitual and unceasing companionship of such errors, with such openness and greatness of mind, as not to retain some bias to his impressions and opinions in favour of inveterate and established systems. You cannot inscribe fresh characters on the writing-tablet without expunging the former ones; but, in the mind, you will scarcely obliterate the first drawn characters, save by inscribing others.

This bias, as we think, ought to be counteracted, and these our statements have this scope, (we speak it without reserve), to lead men willing, not to drag them reluctant. All forcing, (as we from the first professed), we would banish: and as Borgia jestingly noted of the invasion of Italy by Charles the Eighth, that the French had come with chalk in their hands to mark the public-houses, not arms to force their way through the land; so we too anticipate a like pacific tone and result of our discoveries, namely, that they shall segregate minds of large capacity from the crowd, and into these shall make their way, rather than be obnoxious to men of opposite opinions.

But in this part of our subject, in which we now treat of the redargution of the vulgar philosophies, our task hath been happily lightened by a timely and extraordinary circumstance. For while meditating these points, there came to me a certain friend, then returning from France, of whom, after due courtesy done, I inquired much, as he (in the wont of intimate friends) of me, in regard of our various affairs. "But how do you employ," said he at length, "those intervals which are unoccupied with public business, or at least wherein its bustle abates." "A question in good time," I answered; "lest you should suppose I do nothing at all in such hours, I must tell you, I now meditate a renovation of philosophy, which shall embrace no-

thing airy or abstract, and which shall advance the interests of mankind." "A noble undertaking, doubtless," said he; "but whom have you for associates in this work?" "None at all," was my reply; "I have not even a person with whom I can converse without reserve on such subjects, none at least in whose converse I can explain myself, and whet my purpose." "A hard fate," he said, "yet know," he immediately added, "that others have also at heart such subjects." Whereupon I exclaimed with joy, "Precious raindrop of hope, that hast at last sprinkled my thirsty spirit, and recalled me to life. Why I met not long ago a certain evil-eyed old fortune-telling woman, who muttering I know not what, prophesied that my offspring should die in the desert." "Would you," said he, "that I mention a circumstance relating to such matters, which I met with myself in France." "Most willingly," I replied, "and shall be grateful besides."

He then related that he had, while at Paris, been invited and introduced by a friend of his to an assembly of personages, "such," said he, "as you too would have loved to see. No occurrence of my life was ever more delightful than that introduction. There were about fifty present, none young, but all mature of years, and of whom each in his aspect wore a stamp of dignity and of honour." He related, that among them he recognized men who had held offices of state, others senators of the realm, divers eminent ecclesiastics, and some generally of all the notable classes of the body politic. And when he entered at first, he found them occupied with easy converse one with another, yet they were ranged on seats placed with some formality of order, and sate as if expecting some one's coming.

Not long after there came to them a personage of an aspect, as he thought, mild and exceedingly placid, yet the comportment of his features was as of one that pitied men. And, when they all stood up to receive him, he looked around, and said with a smile; "I could never have conceived, now that I recognize your features, one after another, that the idle hour of all of you should have fallen upon the same nook of time, and I cannot enough admire how it hath so occurred." Whereupon one of the assembly made answer, that it was he himself that had occasioned that leisure, seeing that what they expected to reap from him, they regarded as preferable to all business. "I perceive," he answered, "that the whole waste of the time here consumed, in which each of you, if apart, might have benefited many, is

to be charged to my account. If this be so, I must see, in good sooth, that I detain you not over long." With these words he sate down, not on an elevated seat or academic chair, but on a level with the rest, and discoursed to the assembly, somewhat to the following effect. For my informant said, that he tried as he might to catch up the address, but while going over his remembrances of it with the friend who had introduced him, they seemed far short of what had then been spoken. He then produced a specimen of the speech which he had taken down, and which he had then about him.

"My sons, ye are doubtless but men and mortal, yet will ye not so much repine at the terms of your being, if ye sufficiently remember your nature. God the creator of the world and of you, has endowed you with souls to contain that world, and yet remain unfilled and unsatisfied. Wherefore he has claimed your faith for himself, but the world he hath submitted to your sense; and hath decreed that the oracles of both should not be clear, but ambiguous, so as profitably to exercise you, and to balance the excellency of the things discovered. Now as regards truths divine my hope of you is good: but as concerns things human I am in fear for you, lest you be involved in a train of endless errors. For I consider, that you are intimately persuaded of one thing, namely, that you now enjoy a flourishing and auspicious state of science. I on the other hand admonish you, not to regard the copiousness or utility of the knowledge you possess, as if you had been exalted to some pinnacle of superiority, or had satisfied your aspirations, or completed your labours. Revolve the matter thus:

"If you take to task the whole of that huge congeries of writings wherewith the sciences are so puffed out and overgrown, and mark them with a strict and sifting scrutiny, you shall every where note infinite repetitions of the same thing, diversified in words, arrangement, examples, and illustrations, yet in the sum and weight and real effect of things all anticipated, and manifestly only repetitions, so as there is at once poverty and parade, arrogance and miserable jejuneness. And if I may be allowed a colloquial ease and pleasantry on this subject, this learning of yours very much resembles the well known supper of the host of Chalcis, who being asked whence he had such store of different hunter's fare: answered that all his dishes were of the flesh of a tame boar. For you will not deny that the whole of that seeming copiousness is nothing but frag-

ments of the philosophy of the Greeks, and that not reared, to continue the metaphor, in the woods and wilds of nature, but styed up in the schools and scholastic cells like the domesticated animal. For if you give up the Greeks, and a few Greeks too, what (I pray you) have the Romans or Arabs, which doth not emanate from, and fall back into, the systems of Aristotle, Plato, Hippocrates, Galen, Euclid, and Ptolemy? Thus you see your entire hopes and fortunes wrapt up in the weak brains and limited souls of about half a dozen mortals. Yet it was not for this that God implanted in you reasonable souls, that you should obsequiously give up to human beings that part of you which he vindicates for himself,—implicit faith due only to the things of God. Nor hath he allotted to you the firm and vivid informations of the senses, to contemplate the works of a few men, but his own works, his heaven and earth, celebrating the while his glory in your hearts, and while you lift up a hymn to your Great Author, admitting, if you will, these mortals, (and wherefore should you refuse), to a place beside you in the worshipping quire."

W. G. G.

THE PHENOMENA OF THE UNIVERSE;

OR,

NATURAL HISTORY

FOR THE BASIS OF NATURAL PHILOSOPHY.

PREFACE.

Upon my taking into consideration the errors that prevail with respect to the true grounds of forming theories and conducting experiments, I felt it my duty myself to remedy these evils, to the best of my ability. There cannot indeed be any thing more meritorious than to lead men to throw off the masks of authorities and their blind admiration of experiments, and to enter into a nearer communion with things themselves and a thorough investigation of them.

For so our knowledge of them will be at once deep and secure, and will be moreover at hand, and the sources of utility will be multiplied. But the first principles of this design must be derived from the knowledge of nature. For all the philosophy of the Greeks, with all their different sects, and, indeed, whatever other philosophy may be mentioned, appears to have been built upon too narrow a basis and on an insufficient acquaintance with nature. For taking up some few things from experience and from tradition, and that sometimes without accurate examination, they placed the rest in meditation and in the exercise of their ingenuity; relying too much upon dialectics: but the chymists and the whole class of mechanics and empirics, if they conducted their observations and philosophy with more boldness, being accustomed to an accurate nicety in some things, bend all others by the most singular methods to them; and give out opinions the most monstrous and unnatural. For the one class, out of many things take but little, the other out of but little take much into the body of their philosophy; and to speak the truth, the method of either class is unsound, and will not hold. But the knowledge of nature which has been hitherto collected, however copious it may at first sight appear, is really meagre and unprofitable. Neither is it of that kind for which we are inquiring. Nor is it yet cleared of fable and absurdity, but runs out into antiquity and philology, and relations of things unconnected with it, neglecting and rejecting what is solid, but laboriously curious upon trifles. But the worst of this kind of copiousness is this, that it embraces the investigation of natural objects, and yet for the most part declines the study of things mechanical. And these are the very things which by far excel the others in the searching out the secrets of nature, for nature being of itself vast and diffuse, dissipates the mind and confounds it by its variety. But in mechanical operations the judgment is collected and the designs and workings of nature are discerned, and not the effects only. And besides, all the subtlety of mechanics stops short of the object which we seek. For the person thus employed being intent upon his work and object, neither raises his mind nor stretches forth his hand to other things, and which perchance avail more to the investigation of nature. There is need, therefore, of greater care and choice kinds of examination and even of expense, and moreover of the greatest patience. For this hath rendered every thing in the department of experiment useless, that men have from the beginning

sought out experiments for the sake of gain and not of knowledge, and have been intent upon bringing out something magnificent, not upon revealing the oracles of nature, which is the work of works, and comprehends all power in itself. And this evil hath been occasioned by the fastidious curiosity of men, in generally turning their attention to the secrets and rarities of nature, and in expending all their research upon these, passing over experiments and ordinary observations with contempt. And they seem to have been determined to this choice either from the pursuit of applause, or from having fallen into this error, that the office of philosophy is as much to trace the cause of ordinary occurrences and the remoter causes of those causes, as it is to harmonize extraordinary with ordinary events. But the cause of this universal complaint respecting natural history is chiefly this, that men have not merely erred in their mode of proceeding but in their design. For that natural history which now exists seems to have been composed either on account of the profitableness of experiments or the pleasure of details, and to have been made for its own sake, and not to serve as the elements and as it were to be the nurse of philosophy and the sciences. It is therefore my design, as far as lies in my power, to supply this deficiency. For I have long since made up my opinion as to the province of abstract philosophies: it is my intention also to adhere to the methods of true and good induction, in which are contained all things; and, as it were, by the help of instruments or by a clue to a labyrinth, to assist as much as possible the power of the human understanding, of itself inadequate and very unequal to the attainment of the sciences. And I am at the same time aware that if I would include in that restoration of the sciences, which I have in contemplation, any greater scope, I might indeed reap the greater honour.

But since it has pleased God to give me a mind that can learn to yield to circumstances, and out of a sense of real desert and confidence of success to reject with readiness what is only plausible, I have taken upon myself that part of the work which would probably have been passed over by others altogether, or would not have been treated in accordance with my design. And there are two admonitions which I would give on this head, as at other times, so especially now, in proceeding to this very thing: first, that we should dismiss that notion, which though so thoroughly false and destructive, easily takes possession of the mind, that the investigation of particular objects is an infinite

and endless task: when the truth rather is, that there is no bound to mere opinions and disputes, but that those fantasies are condemned to perpetual error and endless uncertainty: but that those particular objects and the informations of sense (taking out individuals and degrees of things, which suffices for the investigation of truth) certainly admit of comprehension, and that neither too wide and extensive, nor too difficult and adventurous. And secondly, that men frequently bear the object in mind, and that when they fall upon the consideration of very many of the most ordinary, small, and apparently trivial and even low subjects, and which, as Aristotle says, seem to require a previous apology, they will not think that I am trifling, or taking down the dignity of the human mind. For these things are not sought out or described for their own sakes, but no other way is open to the human understanding, nor any other method left of pursuing this work; since we are attempting an object of unrivalled importance and most worthy of the human mind, to kindle in this our age through means offered and applied by the Deity himself, the pure light of nature, the name indeed the boast of men, the thing itself entirely unknown. Nor do I dissemble my opinion that that preposterous subtlety of arguments and imaginations in the time of which the subtlety and truth of the first information or true induction was either passed over or ill set on foot, can never effect a restoration though all the genius of past ages should unite in the design; but that nature like fortune has her hair only upon her forehead. It remains, therefore, that the work be entirely recommenced, and that with greater helps, and laying aside the heats of opinion, an entrance be opened into the kingdom of philosophy and of the sciences (in which all the wealth of man is stored, for nature is overcome only by yielding) in the same manner as into the kingdom of heaven, into which we cannot enter but as little children. But the profit of this work, that plebeian and promiscuous advantage derived from experiments themselves, we do not altogether condemn, since it can doubtless marry desirable suggestions to the observation and invention of men according to their various arts and talents. But we deem it extremely small in comparison of that entrance into human knowledge and power, which through the divine mercy, we look for. And of that mercy we again desire, that it may see fit to enrich anew the human family through our hands.

The nature of things is either free as in species, or con-

fused as in monsters, or straightened as in the experiments of the arts; but it acts in whatever class are worthy of commemoration. But the history of species which at present exists, as of animals, metals, and fossils, is tumid and impertinent; the history of prodigies vain and grounded upon slight reports; the history of experiments imperfect, tried by parts, treated negligently, and made entirely with a view to action and not philosophy. It is, therefore, my design to contract the history of species, to examine and revise the history of prodigies, and to put forth my principal labours upon experiments mechanical and artificial, and upon the subjection of nature to the hand of man. For what are the sports and wantonings, as it were, of nature to us? that is those trifling differences of species according to their forms, which are of no service to our pursuits, and with which natural history nevertheless teems. The knowledge of things wonderful is indeed pleasant to us, if freed from the fabulous, but on what account does it afford us pleasure? not from any delight that is in admiration itself, but because it frequently intimates to art its office, that from the knowledge of nature it may lead it whither it sometimes preceded it by its own unassisted power. To artificial experiments we entirely attribute the first place in kindling the light of nature, not so much because they are highly useful of themselves, but because they are the most faithful interpreters of natural occurrences. Would any one, for instance, have so clearly explained the nature of lightning or of the rainbow, before the reason of both was demonstrated, of the one through the instruments of war, of the other through the artificial resemblances of the rainbow on the wall. But if they are faithful interpreters of causes, they will also be certain and successful signs of their effects and operations. And I shall not depart from this threefold division of my history to treat each subject separately, but shall mix the kinds themselves natural with artificial, ordinary with extraordinary, and keeping close to every subject in proportion to its utility.

It is usual to begin with the phenomena of the air. But in strict adherence to my object, I should prefer those phenomena which constitute and produce a more common nature of which both globes partake. We will begin, therefore, with the history of bodies according to that distinction which appears the simplest, that is, the quantity or paucity of matter contained and extended within the same space or the same boundaries. For as no axiom in

nature is more certain than that twofold one, that out of nothing nothing comes, and that there is not anything which can be reduced to nothing, but that the quantum itself of nature, or the universal sum of matter, is ever the same, admitting neither of increase nor of diminution; so it is not less certain, although it has not been so clearly remarked or asserted (whatever men may pretend respecting the power of matter being equally proportioned to its forms), that out of that quantum of matter more or less is contained under the same dimensions of space, according to the difference of the bodies by which they are occupied, of which some are very evidently found to be more compact, others more extended or diffused. For a vessel or a cavity filled with water and air cannot receive the same portion of matter, but the one more and the other less. If, therefore, any one were to assert that from an equal quantity of air an equal quantity of water could be produced, it would be the same with asserting that something could be produced out of nothing. For that must, of course, be supplied out of nothing which is supposed to be wanting in matter. Again, if it were asserted that an equal quantity of water could be turned into the same quantity of air, it would be the same with asserting that something could be reduced to nothing. For the superfluous matter must, of course, have vanished into nothing. And I do not doubt that this will admit of calculation imperceptible in some respects, but definite and certain, and known to nature. As, if one were to say, that a body of gold compared with a body of spirit of wine were a collection of matter exceeding in a ratio of twenty to one, or thereabout, he would speak the truth. In setting forth, therefore, that history which I have spoken of, respecting the quantity and paucity of matter, and the union and expansion of matter, from which those notions of density and rarity (if rightly considered) have their rise, I shall preserve this order; in the first place, to give an account of the relative proportions of different bodies (as of gold, water, oil, fire), and having examined the ratios of different bodies, I will afterwards treat of the retirings and excursions of the same body, with calculations or proportions. For the same body, without accession or subtraction, or with the smallest possible degree of either, from various impulses both external and internal is able to gather itself into a greater and lesser sphere. For sometimes the body endeavours to return to its former sphere, and sometimes evidently exceeds it. In the first place then, I will enumerate the courses, differences, and proportions of any natural body

(in relation to its extent), comparing them with its interstices or pores, that is, its pulverizations, calcinations, vitrifications, dissolutions, distillations, vapours, exhalations, and inflammations. In the next place, I shall lay down the actions and motions themselves, the extent and bounds of the contraction and dilatation, and when the bodies return to themselves, and when they exceed according to the measure of their extent; but I shall note particularly the efficients and means through which this kind of contractions and dilatations of bodies follow, and, in the meantime, shall subjoin by the way, the powers and actions which accrue to bodies from such compressions and dilatations.

And as I well know how difficult it is in the present state of the mind to acquire a familiarity with nature now from the very elements, I shall add my own observations, in order to excite the attention and raise the thoughts of others. But with respect to demonstration, whether as to the discovery of the density and rarity of bodies, I have no doubt that, with respect to thick and palpable bodies, the motion of gravity, as it is called, can be assumed as the best as well as readiest proof; for the gravity of a body will be in proportion to its compactness. But after we have come to the class of ethereal and spiritual substances, then indeed we have no measure or rule whereby to go, and shall need another method of investigation. But we will begin with gold, the heaviest of all bodies within our knowledge (for philosophy is not yet so matured as that we ought to venture an opinion respecting the bowels of the earth), and embraces the greatest quantity of matter in the smallest space; and we shall apply the ratios of other bodies to the sphere of this; intimating, however, that here we scarcely touch upon the history of weights, except as far as it may throw light upon the demonstrating of the dimensions of bodies. But as our design is not to publish conjectures, but to discover and gain knowledge, and this appears to lie in the examination and proof of the first experiments, I have determined in every very subtle experiment to subjoin the mode of experiment I have made use of, that after it is clearly ascertained how each thing by itself appears to me, men may see how far they may rest satisfied, and what further remains to be done, whether in the correction of errors which may still cleave to the work, or in the calling forth and employing of more accurate modes of proof. And I will for my own part diligently and sincerely intimate those subjects which appear to me to be less satis-

factorily explored, and to lie as it were nearer and more open to error. Lastly, I will add my own observations, as I before said, so that whilst every part of philosophy is preserved entire, I may yet even by the way turn the face itself of natural history toward philosophy. It will be my care also to remark whatever those things are, whether experiments or observations which occur and intervene beside the scope of our inquiry, and pertain to other denominations, that the investigation may be kept distinct.

A TABLE OF THE CONJUNCTION AND EXPANSION OF MATTER THROUGH SPACE IN TANGIBLE BODIES, WITH A CALCULATION OF THEIR RATIOS IN DIFFERENT BODIES.

That occupy the same space, or are equally extended.

	An ox.	or dwt.	gr.	
Of pure gold	20	0		1
quicksilver	19	9		2
lead	12	1½		3
silver	10	21		4
tin-glass	10	13		5
copper	9	8		6
chalciform gold	9	5		7
steel	8	10		8
brass	8	9		9
iron	8	6		10
tin	7	22		11
the loadstone	5	12		12
the touchstone	3	1		13
marble	2	22½		14
flint	2	22½		15
glass	2	20½		16
chrystal	2	18		17
alabaster	2	12		18
rock-salt	2	10		19
common loam	2	8½		20
white loam	2	5½		21
nitre	2	5		22
ox bones	2	5		23
powdered margarites	2	2		24
sulphur	2	2		25
common earth	2	1½		26
white vitriol	1	22		27
ivory	1	21½		28
alum	1	21		29
oil of vitriol	1	21		30
white sand	1	20		31
chalk	1	18½		32
oil of sulphur	1	18		33
common salt	1	10		34
lignum vitæ	1	10		35
sheep's flesh	1	10		36
aqua fortis	1	7		37
ox's horn	1	6		38
Indian balsam	1	6		39
red sandal wood	1	5		40

	An ox.	or dwt.	gr.		
Of agate	1	5			41
new onion in the lump, or fresh	1	5			42
camphire	1	4			43
fresh dry fig-root	1	4			44
ebony	1	3½			45
seeds of sweet fennel	1	3½			46
clear amber	1	3			47
vinegar	1	3½			48
verjuice of sour apples	1	3			49
of water	1	3	a little under.		50
urine	1	3			51
oil of date-leaves	1	3	a little under.		52
claret	1	2⅞			53
white sugar	1	2½			54
red wax	1	2			55
china-root	1	2			56
substance of raw winter pear	1	2			57
distilled vinegar	1	1			58
distilled rosewater	1	1			59
ashes	1	0½			60
benjamin	1	0			61
myrrh	1	0			62
butter	1	0			63
fat	1	0			64
oil of sweet almonds	0	23½			
oil extracted from green mace	0	23½			
herb sweet marjoram	0	22			
petroleum	0	23			
flower of rose	0	22			
spirit of wine	0	22			
oak	0	19½			
soot	0	17			
fir	0	15			

THE MODE OF EXPERIMENT UPON THE ABOVE TABLE.

Let the weights which I have used be understood to be of the same kind and computation with those of goldsmiths, a pound being twelve ounces, and an ounce twenty pennyweights, a pennyweight twenty-four grains. I have chosen gold as a standard of the ratios of other bodies, according to the measure of its extension, not so much because it is the heaviest of bodies, as because it is the most unique. For other bodies which, in some degree, partake of inconstancy, even after they have been tried by fire, retain a diversity of weight and dimension; but pure gold appears to be entirely free from this property, and to be the same in all circumstances. The experiment adopted in this case was this: I made an ounce of pure gold into the form of a cube; I then prepared a small square vessel to receive that body of gold, and to agree with it exactly, except that it was a little too high; yet so as that there might be marked, by a distinct line, a space within the vessel in which the gold cube might ascend. I did that for the sake of fluids, that, when any fluid was to be put into the same vessel, it might not flow over, but, by this method, be more conveniently preserved in an accurate measure. I had, at the same time, another vessel made in size and weight equal with the former, that in a like vessel the ratio of the contents of the body might appear by itself. Then I had made cubes of the same magnitude or dimensions in all those materials specified in the table, which were capable of division. But the fluids I made use of at the time, by filling the vessel until the fluid ascended to the place that was marked; and the powders in the same manner; but those as closely pressed as possible; but this with an especial view to their lying even and not suffering injury. The proof, therefore, was no other than that one of the vessels being empty, should be put with an ounce in one scale, another of the vessels in another, with a body in the lump, and the ratio of the weight be taken; so that in the proportion of its diminution would the dimensions of the same body be increased. For example, when a cube of gold gives one ounce, but one of fat a pennyweight, it is clear that the extension of the body of gold, compared with the extension of the body of fat, has a twentieth ratio. It was desirable also, that the mode should be noted down of the measure which comprehended an ounce of gold; it was that of a pint of wine, according to English measure, a fraction a little less than two hundred and sixty-nine. The

proof was this, I marked the weight of the water which was in the vessel, under the line aforesaid, and then the weight of water contained in a pint, and collected the ratios of the measures from those of the weights.

CAUTIONS.

Observe whether, perchance, a closer contraction of the body from the united force produce a greater ratio of weight than is in proportion to the matter, whether or not this be the case, will appear from the peculiar history of the weight. If it should be so, the calculation is certainly erroneous, and the more bodies are extended so much the more of matter they possess, than is in proportion to the calculation of weight and measure which depends upon it.

The smallness of the vessel which I made use of, and the form of it, although very convenient for the receiving of the beforementioned cubes, was not equally suitable for the taking of the ratios with the strictest accuracy. For it could not well receive particles beneath a half or a quarter of a grain, and that square surface, in a small and imperceptible ascent or altitude, was capable of attracting a remarkable difference in the weight contrary to what it is in vessels rising to a point.

3. There is no doubt, that very many bodies noted in the table receive more or less within their species, according to weight and dimension. For waters, wines, and the like, differ from one another in gravity. Therefore, as it respects the minutest calculation, the thing itself receives some modification; neither can the individuals, upon which our experiment falls, decide with exactness the nature of the species, nor perhaps agree minutely with experiments made on others.

4. I have set down in the above table those bodies which could conveniently fill the space or measure, each with its body in the lump, and could, as it were, be assimilated, and from the ratios of the weight, of which a judgment might be formed respecting the collection of matter. Three kinds of bodies, therefore, could not be brought into our computation; first, those which would not satisfy cubical dimension, such as leaves, flowers, fibres, membranes; 2dly, bodies with unequal pores and cavities, as sponges, fleeces, and cork; 3dly, pneumatic bodies are without weight.

OBSERVATIONS.

The collection of matter in those tangible bodies, which have come under my observation, is within the ratios of

twenty-one parts or thereabout. The collection of matter is found most compact in gold, and most expanded in spirits of wine (we speak of bodies which are whole, and not porous). For spirit of wine occupies a space twenty times, and that repeated, of the space which gold does, according to the ratios of one ounce to twenty-two grains. For of those twenty-one parts, of which some are more compact than others; metals occupy thirteen parts, for tin, the lightest of metals, is almost eight pennyweights, thirteen, that is to say, below that of gold. For all this kind of variety, leaving metals, is confined within those eight remaining parts, and again, that remarkable variety which, by beginning inclusively from stones, is extended to those other subjects, is confined within three parts only, or but little more. For the touchstone, the heaviest of stones (excepting the loadstone), preponderates by little more than three pennyweights. But spirit of wine, the limit of levity in compact bodies, is lighter by little less than one pennyweight. A great gap presents itself from gold and quicksilver to lead, namely, from twenty pennyweights and a little under, to less than twelve. And although great metallic bodies abound in variety, I am not inclined to suppose that there are any intermediate bodies, excepting, perhaps, the elements of quicksilver. From lead there is a gradual ascent to iron and tin. Again, there appears a great hiatus between metals and stones, namely, from eight to three pennyweights: for such, or about such, is the distance from tin to the touchstone. Only between these comes the loadstone, and almost on a par, and this is a metallic stone; and probably other fossils may be found of imperfect mixture, and of a nature compounded between stone and metal. From stones, indeed, to the other bodies there is a gradual variation.

But we little doubt that, as to vegetables and also in the parts of animals, they show themselves more than other bodies, although of sufficiently equal texture, which surpass spirit of wine in lightness. For even the wood of the oak, which is firm and solid, is lighter than spirit of wine, and the wood of the fir much more. And very many flowers and leaves, and membranes and fibres, as the skins of serpents, the wings of insects, and the like, would doubtless approach the lesser ratios of weights (if they were capable of cubic dimension), and much more artificial substances, as tinder, the leaves of roses after distillation, and the like.

We generally find as to the parts of animals some bodies more compact than in plants. For bones and skins are

more compact than woods and leaves; for we must correct that proneness which the human mind entertains toward conjecturing that bodies are hard and consistent, in proportion to their compactness and solidity, but that fluids are naturally less contracted. For a collection of matter is not less in fluids than in solids, but rather more. Gold, by a certain softness which it possesses, verges to a fluid state, and, when liquefied, is not extended, but is contained within its former place. And quicksilver flows of itself, and lead easily flows, iron with difficulty, of which the one is a very heavy, the other a very light body. But this is especially to be noted, that metals which are frangible (fluids to wit), far exceed stones in weight.

It is very remarkable of gold and quicksilver, which are so much heavier than other metals, that they are found sometimes in grains and small particles, as if perfect by nature and commonly pure, which happens to no other metals, which must unite and be purified by fire, whereas these two, the conjunction of which is by far the greatest and the strictest, is natural and without the aid of fire.

In the investigation of the nature of metals and stones, some inquiry should be made respecting those metals which are found lower than others and are deeper in the earth, as to whether there is any certain rule and standing experiment on this head. But here we must take into the consideration the region in which the mines or quarries are found, whether it be higher ground or whether lower. And in the same manner as to stones and diamonds that are chrystals, whether the stony nature penetrate the earth so deeply as the metallic, or rather attaches only to the surface, which appears the more probable supposition.

Sulphur, commonly deemed the father of metals, though generally not so by the learned, or sulphur transferred to a kind of natural and not common sulphur, has a collection of matter inferior to every kind of metal and even to stones and the stronger earths, by two pennyweights and two grains; and yet (if other circumstances concur) if mixed up with mercury, on account of the admirable gravity of this latter, it could give the weights of all metals according to the ratio of the temperament, except the weight of gold.

The efficient of conjunction in bodies is not always considered in respect to their accumulation. For glass, which joins by means of a fierce and powerful fire, outweighs chrystal, which is its original nature, and is extracted without fire or apparent heat; for as to ice being a solid, that is a popular error, and chrystal itself is much heavier than

ice, which is plainly kept together by cold, and yet it floats upon the water.

The mixture of liquors does not depend upon or arise from the ratios of their weights only, since the spirit of wine is not mixed with distilled oil of almonds, but (what would not appear probable) floats upon oil as oil upon water; and yet (as may be seen from the table) is only lighter by a grain and a half. But at the same time spirit of wine is by far more easily mixed with the spirit of water, though heavier; and as water itself is more easily mixed with oil of vitriol than with oil of olives; and yet oil of vitriol is heavier than water by eighteen grains, but oil of olives lighter by four. But this is not to be received without a particular consideration of the weight in bodies proportioned according to the mixture. For we see that wine floats upon water, if the agitation is represt or there is a perturbation of the descent or first state; as when into a vessel in which water is contained you pour wine, but with a piece of bread or cloth intervening, which would break the power itself of the first condition. And the same takes place in water poured upon oil of vitriol with this design. And what is more; although wine be first poured in and afterward water (upon the bread or cloth as aforesaid), it finds its own place, and passes through the wine and settles itself.

CONTINUATION OF THE HISTORY OF THE CONJUNCTION AND EXPANSION OF MATTER IN THE SAME BODY.

I deem that our investigation into the ratios of powders will be attended with greater utility if we compare them with the bodies themselves, in their complete state, and do not consider them simply by themselves. For by this means a judgment may be formed respecting the difference of the bodies and concerning those connexions and chains of their perfect nature which are the closest. But in the ratios of powders, we understand powders as comprest as possible. For this conduces to their evenness, and does not suffer accident. Mercury in the lump has in that experimental measure on which the table proceeds, 19 dwt. and 9 gr., but sublimated in powder, 3 dwt. and 22 gr.

Lead in the lump, 12 dwt. 1½ gr. but in white lead, in powder, 4 dwt. 8½ gr.

Steel in the lump 8 dwt. 10 gr., but in prepared powder (such as is used in medicines), 2 dwt. 9 gr.

Chrystal in the lump, 2 dwt. 18 gr., in powder, 1 dwt. 20 gr.

Red sandal in the lump, 1 dwt. 5½ gr., in powder, 16½ gr.

The wood of the oak in the lump, 19½ gr., in ashes, 1 dwt. 2 gr.

But that the ratios of powder prest and not prest may be the better understood, and that according to the difference of the bodies, I have taken the weight of roses in powder, since it could not be taken into the table in the lump: that gave in powder not prest, 7 gr., in powder prest, 22 gr., but at the same time in the wood of the tried red sandal, red sandal in powder not prest, 10 gr., prest, 16½, so that powder of rose is much lighter than that of sandal if not prest, heavier if prest. I have also taken, as a supplement to the former table, the ratios of powder in some examples from flowers, herbs, and seeds (for the dimension of roots could not be cubic), for an example of the rest in their own species; and I find that the powder of rose-flower, as aforesaid, gives 22 gr., of sweet marjoram, 23, of sweet fennel, 1 dwt. 3½ gr. I have taken also in powders the weight of other bodies which could not have been taken into the table, as of white sand. This gave 1 dwt. 20 gr.; of common salt, 1 dwt. 10 gr.; of sugar, 1 dwt. 2½ gr.; of myrrh, 1 dwt.; of benjamin, 1 dwt. In this same table you may see that sulphur, in the lump, yields 2 dwt. 2 gr., in chymic oil, 1 dwt. 18 gr.; but vitriol in the body, 1 dwt. 22 gr., in oil, 1 dwt. 21 gr.: wine in the body, 1 dwt. 2 gr., and distilled 22 gr.: vinegar in the body, 1 dwt. 2 gr., distilled, 1 gr. 1 dwt.

CAUTIONS.

When we speak of weight in the body, and in the powder, we do not understand it of the same individual, but of the body and powder of the same species contained within the same tabular measure.

For if the wood of the oak be taken and at the same time the wood in the individual be reduced to ashes; it both loses a great part of its weight, and the ashes do not by a considerable proportion fill the measure of the wood.

The method of pulverization has considerable influence with respect to the opening or expanding the body. For there is one ratio of powder which is produced by simple bruising or filing, another of that which is produced by distillation as of sublimate; another of that which is pro-

duced by turning it, as it were, into rust by means of aquæ fortes, and consumptions; another of that which is produced through fire, as cinders, calx. When these therefore are under consideration, they will not admit in any way of comparison.

It is not my design to dwell longer on each particular subject than is requisite in order to my present undertaking; I cannot, however, refrain from intimating by the way such others as would facilitate it though not absolutely demanded in this place: especially I would propose that a table should be made of bodies with their pores, with each body with its powders, calcinations, vitrifications, dissolutions, and distillations.

We leave to the proper history of weights the history of the variation of weights in individuals, that is, of the same body in the lump and in powders, as of water in snow or ice, and the same dissolved, of an egg raw and prepared for food, of a fowl alive and dead.

OBSERVATIONS.

In more compact bodies the compactness of the parts is much closer than to admit of being equalled by any position or pressure of its powders. And in proportion to the gravity and solidity of bodies is the difference between the whole bodies and their pores, as the ratio of quicksilver in a state of nature to quicksilver sublimated in powder is fivefold or more; the ratios of steel and lead do not ascend to fourfold; the ratios of chrystal and sandal do not ascend to twofold.

In lighter and porous bodies there is perhaps a looser position of the parts in the bodies in their whole state than in their compressed powders, as in dry rose-leaves. And in bodies of this kind there exists a greater difference between their powders prest and not prest.

The parts of powders can so sustain themselves that powder not prest will fill a measure thrice that of powder prest.

Metallic bodies, as sulphur or vitriol, turned into their oils, retain their weight to a remarkable degree. There is not, indeed, a great difference between the oils and the bodies themselves. Doubtless by distillation they are attenuated and lose in weight: but this is the case with wine in a double degree to what it is with vinegar.

The pore in sublimated powder, as compared with that in the body in its natural state, is worthy of notice from

this circumstance, that although so great (for it is as I have said fivefold), and that not in a transient, as in the vapours of quicksilver, but in a consistent body, it returns without difficulty to its former orbit.

CONTINUATION OF THE HISTORY OF THE CONJUNCTION AND EXPANSION OF MATTER THROUGH SPACE IN THE SAME BODY.

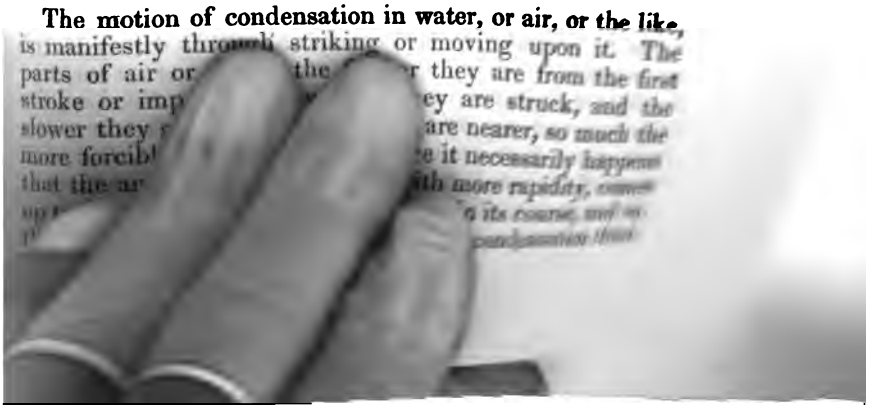
Animals in swimming depress the water with their hands or feet; that being depressed, rises above its natural consistency, and bears up the body rising upon it. But skilful swimmers can so balance themselves upon the water, as to keep themselves up for a time without moving their arms or legs; nay, to walk upright and on the water, and perform other feats of agility.

Waterfowls, indeed, are webfooted, and so can conveniently depress the water with the membranes of their feet; but can swim better in deep water.

Birds in flying beat and condense the air with their wings, but the air, (as was said of water) restoring itself to its own consistency, carries the bird. And birds also sometimes cut their path with expanded wings but retained in one position, or now and then striking their wings a little and then returning to their gliding motion. And there is an analogy between winged animals, whether feathered or not. For flies and all creatures of that kind have their membranes of wings with which they beat the air. But the weakness of their wings is made up by the lightness of their bodies. Winged creatures are more easily borne up aloft, especially those which have broader wings, as the swallow, though their motion is not so swift. And all birds which are of considerable magnitude have more difficulty in the first stage of their flight, in elevating themselves from the earth, since the air is of course not so deep.

CAUTION.

The motion of condensation in water, or air, or the like,



is natural results from their conjunction, the bodies of water or air leap back and return, in order to open and loose themselves.

HISTORY.

The face of water and of every fluid is uneven after agitation and perturbation, and that by an inequality moveable and successive, till the water regains its proper consistency and is freed from the pressure: as in the waves of the sea and of rivers, even after the winds have calmed, and in all disturbed water.

The same kind of inequality is evidently in the winds also, which roll themselves together in the same manner as the waves: neither do they return to tranquillity immediately on the cessation of the first impetus, except that in the undulation of the air, the motion of gravity, which in water is joined with the motion of liberation from pressure, does not intervene.

A stone thrown sidelong on the water (as boys do in play) leaps off and repeatedly falls and is struck again by the water. Swimmers when from an eminence they leap headlong into the water, guard against dividing it through the joining of their thighs. Lastly; water struck by the hand or by the body with power, beats like a ferula or any rather hard body, and causes pain. And in skiffs and keels of vessels which are guided by the force of oars, the water pushed forward and borne down by the oars behind the rowers forces the skiff forward, and makes it move on its way, and bound onward as a boat is moved off from the shore by the waterman's pole. For the water, gathering itself behind the stern of the vessel and urging it into a contrary direction, is not the principal cause of this, which nevertheless arises from the pressure relaxing itself.

Air, in avoiding compression, imitates and puts forth all the actions of a solid body; as we may see in the winds, which direct the courses of ships, overthrow houses and trees, and prostrate them to the ground.

The stroke that is given from a sling, hollow and long, so as to help the compression of the air, is owing to the same cause.

Boys in imitation of cannon scoop out the wood of the alder tree and stop up each end of a squirt with bits of the root of the fleur de luce, or of paper rolled up, and then shoot off the little ball by means of a wooden pin, but before that touches it, the further ball is sent off with an audible force by the power of the air shut up in the squirt.

Air forcibly condensed becomes colder and seems to approach nearer the nature of water, as when we raise the wind with a fan, we perceive the air with a hurried motion by pressing forward, beating back again, or as when by drawing our lips together, the breath becomes cold, or as may be seen in bellows.

And when in the open air, you will find that it is much cooler when the wind is blowing than when the air is perfectly calm.

In the generation of sounds air condensed imitates the nature of a solid body, for as between two solid bodies sound is produced by percussion, so a sound is produced between a solid body and air condensed, and again between two opposite bodies of condensed air. For with respect to the chords in musical instruments it is plain that the sound is not emitted by touch, or by the percussion between the finger or the bow, but between the chord and the air.

For a chord when it rebounds, and that with celerity from its being stretched, first condenses the air, and then strikes it. Instruments also put into sound by the breath, on account of the very weak motion of the breath compared with that of a stringed instrument, are of necessity made hollow to assist the compression of the air, which is also considered an assistance in stringed instruments.

Water pent up makes a way for itself with a powerful impetus, and diffuses itself on all sides, in order to obtain its natural latitude, as under the arches of bridges. In the same manner also wind narrowed and condensed bursts forth with violence. Whirlpools produce whirlpools, for since the natural relaxation is impeded, each part sustains an equal pressure.

Water emitted on a sudden with force from a confined space, reflects the resemblance of a continuous body, as of a thread or rod, or branch of a tree, and becomes straight, afterward bends, then divides itself, and disperses itself into a circle into drops, as in little pipes, or syringes, and gutters.

There is a kind of pool not uncommon in ponds, especially after hay has been mown, or rather seen from that circumstance. The hurricane sometimes raises a quantity of hay in the air, and carries it along for a time together and not scattered, until after it has been borne to a considerable height, the hay disperses itself and forms, as it were, a canopy.

A wooden platter, empty and turned downwards, and placed evenly on the surface of the water, and afterward

put under the water, bears with it down to the bottom of the vessel the air before contained in the platter; but if, with the like equilibrium, it be again taken out of the water, you will find the air to have conveyed itself into not much less space than it before filled. This will appear from the colouring of the lip of the platter at the place whither the water had ascended, and from which the air received itself within.

In a bed-room, if a window be left open when the wind blows, if there be no other vent, it is not very much felt (unless it be violent), since it is not received by the body of wind which had filled the room, and was somewhat condensed by the first gentle wind, and afterward does not admit of condensation; but as soon as a vent is given, it is then manifestly perceived.

For the more comfortable continuance of workmen under water, it has been thought that a large hollow vessel might be constructed of metal, or of some other kind of material, to be let down to the bottom of the water; that it might be sustained by a tripod, with the feet affixed to the brim of the vessel, and the feet to be a little less than the human stature. The vessel was let down into a great depth, with all the air it contained, in the same manner as was described in the case of the platter, and was set upon its feet, and stood just by the spot where the work was to be carried on. But the divers, who were the workmen, when they wanted respiration put their heads into the hollow of the vessel, and having taken a supply of air, returned to their work. And I myself in a bath made my servant put his head into a basin under the water depressed with air, and he so remained for half the quarter of an hour, until he felt that the air, warmed by his breath, brought on a feeling of suffocation.

To try by the bladder whether air readily admits of some small contraction would be a fallacious experiment. For when the bladder is filled with wind, the air is condensed by the wind itself, so that the air within the bladder is more dense than common air, and therefore may be expected to be less adapted to a new condensation. But in the usual experiment of the wooden plate forced down beneath the water, you may see that the water, entering from the extreme part of the vessel, has occupied some space, and that the air has occasioned a defalcation of the same space.

But in order more clearly to illustrate the proportion, I placed a small globular, or other solid body, and that would sink, at the bottom of the vessel, above which the plate

was to be placed; then I placed above that another plate metallic and not wooden, that could stand of itself at the bottom of the vessel. But if that body be small in size, when it is received into the hollow of the plate, it forces the air together, and does not expel it; but if of greater magnitude than to admit of the easy yielding of the air, the air impatient of this greater pressure, somewhat lifts up the plate, and ascends in bubbles.

And I had a hollow leaden globe made, the sides of it sufficiently firm to bear the force of a mallet or of a press: and this globe, being struck at either pole with mallets, approached nearer and nearer to a planisphere. And it yielded more readily under the first contusions, afterward less so, according to the measure of the condensation; so that at the last the mallets were of but little service, and there was need of pressing, and that with some violence. But I enjoined, that, after the pressing, a few days should be suffered to elapse, but this has no relation to our present design, but looks another way.

Air, by a powerful exsuction into closed vessels, is extended or dilated, so that part of the air being removed, the remainder nevertheless fills the same measure as the whole had filled; and yet so as to endeavour, as much as possible, to restore itself and to get rid of that extension. You may perceive this in eggs, which contain scented water, and are broken in play, so that they imbue the air with their scent. The way to try it is to let all the food that is in the egg be drained, then let a person confine, by a powerful exsuction, the air itself which has found its way in, and immediately on exsuction bore a hole with the finger, place the egg thus closed under the water, and then take away your finger. But the air turned aside by this tension, and endeavouring to recover its place, draws the water, and enters till that portion of air regains its former consistency.

I have tried the same experiment with a glass (or philosopher's) egg, and find that the water received is about an eighth part of the capacity; so much was the air extended by exsuction. But this depends upon the greater or less violence of the exsuction. But toward the end of the exsuction, it drew with it the brim of the vessel itself. I moreover made use of a new experiment, namely, after exsuction to stop up the hole with wax, and let the egg remain so sealed up for a whole day. I did this to try whether that day would lessen the inclination of the air, as is the case in consistent bodies, in twigs, bars of iron, and the like, the motions of which, to recover themselves from tension, become feebler through

delay; but I find that the effect remains in this instance the same; the egg continues to draw, and with the same force, the same quantity of water as if it had been forthwith put in after exsuction: so that when the hole was opened out of the water, it drew in new air with an audible sound, but the effect of further delay I did not try.

If bellows are suddenly raised and opened, and no breathing place is given, they break; for since so great a quantity of air, as can fill the inside, rising suddenly from a level to a height cannot be drawn through the narrow strait of the beak of the bellows, and the air which is already within it cannot be extended over such a space, the bellows must break.

HISTORY.

If water be in a just quantity put into a glass, and the water's ascent be marked, and a common cinder cleaned through a sieve be put into the water and settle in it, you will see the space occupied by the cinder at the bottom ascend higher by one-fourth than the body of water had ascended on the surface from the place before marked; and hence it is plain, that the water mixed with the cinder either changes its orbit and contracts itself, or that it receives the cinder within the hollow part of the water, since it by no means expands itself in proportion to the cinder received. But if you try this in the very lightest and thinnest sand (but not calcined or reduced by fire), you will find that the water rises at the surface according as the sand does at the bottom. I think also that many infusions load the water, and that it cannot extend according to the bulk of the body received; but I pass by the experiment on this subject.

CAUTION.

I do not confound the motion of succession, which is called motion, to avoid the supposition of a vacuum, with the motion of reception from extension. For these two motions are in time and effect conjoined, but differ in their proportion to each other, as will appear in the proper history of the motion of succession.

Air received through breathing becomes in a little while vapour, so as to cover a lookingglass with a kind of steam, or in winter time so as to be congealed about the beard. But that dew, as it were, upon the bright blade of a sword, or on a diamond, vanishes like a little cloud, so that the polished body seems to purify itself.

The mode of the process of water in the expansion and contraction which take place in the body of it through the medium of fire is thus. Water acted upon by moderate heat emits a little and clear vapour, before any other change is seen within the body of it; the heat then continuing and increasing, the body yet remaining whole, it does not rise nor foam, as it were, in small bubbles, but ascending through greater ones, dissolves itself into copious vapour, but the water soon flies off, and is consumed. And that vapour, if it is not impeded, mingles with the air, being at first visible, and even after it has vanished from sight, perceptible, either by sending forth a scent, or by moistening and softening the air at the touch or at breathing. And at length it hides itself, and is lost in that sea of air. But if first a solid body meet it (and so much the more if it be equal to it and polished), the vapour gently enters into itself, and is returned into the water either by the exclusion or ejection of the air, which was before mixed with the vapour. And that whole process is manifest, as well in the decoction of water as in distillation. But we moreover see vapours which are emitted from the earth, if they have not been thoroughly subdued and scattered by the heat of the sun, nor from the coldness of the air equally commingled with that body of air, although they do not meet a solid body, yet returned into water from the very cold and destitution of heat, so that in evening dew it takes place earlier, in showers later. I have, therefore, upon patient and diligent inquiry set down that the expansion of air, if it be compared with water, amounts to a ratio of one hundred and twenty fold or thereabout.

HISTORY OF THE EXTENSION OF MATTER IN PNEUMATICS.

I have taken a glass phial which could perhaps hold one ounce; I made choice of so small a vessel as for two reasons particularly suited to the experiment, first, that it might sooner bring on the boiling with less heat, lest the bladder, which was to be put above the phial, should be burnt and dried up by an intenser heat: secondly, that it might receive a less portion of air in that part which was not to be filled with water: since I was aware that the air itself received extension through fire. I determined, therefore, of making use of but a little air, that that extension might not disturb the ratios of the water. The phial was not

straight necked without any lip, (for then the vapour of the water would distil more rapidly, and the dew would glide down that part of the bladder which was joined to the neck of the phial) but with the neck at first straightened a little, and then returned as it were with the lip. This vessel I half filled with water, (supposing that this would hasten the boiling) and took the weight of the water with the phial itself by sand put in the scale of a balance. Then I took the bladder which might contain about half a pint, taking care that it should be neither old nor dry and given to resist more from dryness, but new and rather soft. I then tried the soundness of the bladder by blowing, to be certain that there were no holes in it, and then emptied all the air out of it as much as possible. I also first of all applied oil to the outside of the bladder, and made it take the oil by rubbing it in. This I did to make the bladder closer and to stop up the pores (if there might chance to be any) with the oil. I fastened the bladder securely about the mouth of the phial, the mouth of the phial being received into the mouth of the bladder; this was done with a string waxed a little that it might adhere better and tie more closely. But this is made better by clay made out of meal and the white of an egg, and bound with black paper and well dried, as I myself have found. At last I placed the phial over burning coals on a little hearth. The water soon after began to boil, and by degress to inflate every part of the bladder, till it seemed as though it would break. I immediately removed the glass from the fire and placed it upon the carpet, lest the glass should be broken by the cold, and instantly I made a little hole at the top of the bladder with a needle, lest on the vapour being restored to water at the ceasing of the heat, should fall back and confound the ratios. But afterward I took away the bladder itself with the string, and cleared it from the clay, if any had been used, and then weighed the remaining water with the phials again. And I found that about the weight of two pennyweights had been consumed. And I saw that whatever of the body had filled the bladder when it was full of wind, was made and produced from that which had been lost from the water. The matter, therefore, when it was contracted in the body of the water, filled as much space as two pennyweights of the body of water filled: but the same matter expanded in a body of vapour filled half a pint. I therefore set down the ratios according to the dimension expressed in the table: a vapour of water can bear a ratio of

eighty fold to a body of water. The bladder filled with wind in the manner I have mentioned, if no breathing place be given, but it be removed whole from the fire, immediately decreases from the inflation and subsides and is contracted. The vapour whilst the bladder swells, being emitted from the hole, had another kind of vapour distinct from the common one of water more thin, clear, and upright, and not so soon mingling itself with the air.

CAUTIONS.

We must not suppose that if there were a greater consumption of water, a greater bladder could be filled in proportion. I tried this and found that it would not answer, but the inflation that follows upon it does not take place gradually but altogether. This I attribute partly to the inflaming of the bladder which was made harder and would not yield so easily, and was perhaps more porous (but this might be corrected by a moist heat as by the *balneum Mariæ*); but still more to this, that the vapour being increased through the constant succession, inclines to recover itself and condenses itself. The vapour, therefore, which is received into the bladder is not to be compared to those which are received into stoves, because these latter mutually following and urging each other, thicken, but those expand themselves at will from the soft and yielding nature of the bladder, especially at the beginning (as I said), before the copiousness of the vapour brings on its recovery.

The expansion of the vapour of water is not to be judged entirely from the appearance of the vapour which flies off into the air; for that vapour being immediately mixed with the air borrows by far the greatest dimension of its mixed body from the air, and does not remain in its own size. And so it is amplified to the bulk of the air into which it is received, as a little red wine or any other coloured fluid which imparts a colour to a great quantity of water. The exact ratios in so minute a case cannot be obtained without laborious and unprofitable research, and are very slightly connected with our present design. It is enough that from this experiment it is plain that the ratio of vapour to water is not twofold, nor tenfold, nor fortyfold, nor again a thousandfold, two hundredfold, &c. For the limits, not degrees of natures, are the subjects of our investigation. If, therefore, any one, by any accident or slight variation in the mode of his experiment, whether from the shape of the glass he makes use of, or the hardness or softness of the bladder, or the

degree of heat does not fall upon the ratio of eightyfold, the consequence is immaterial. For I suppose that there are none so ignorant as to imagine that pneumatic and volatile vapours, which fly off from heavy bodies, lie hid in the pores of the same bodies, and are not of the same matter with the ponderous body, but are separated from the ponderous part when the water is, as it were, entirely consumed, and evaporates into nothing. A live coal, if placed in the scale of a balance and left till it becomes a cinder, will be found to be much lighter. Metals themselves are changed in a wonderful degree in weight by the evolations of their smoke. The same matter, therefore, is tangible and has weight, and is yet pneumatic, and can be divested of weight.

HISTORY.

The mode of the process of oil is this. If oil be poured into a common glass phial and placed upon the fire, it will boil much more slowly, and will require a greater heat than water. And at first some drops and small grains appear scattered through the body of the oil, ascending with a creaking sound: the bubbles in the mean time do not play on the surface, as is the case with water, nor does the body rise whole, and in general no steam flies off, but a little afterward the whole body is inflated and dilated in a remarkable proportion, as if rising in a twofold degree. Then, indeed, a very copious and dense steam arises: if a fire be applied to the steam, even a good way above the mouth of the phial, the steam forthwith produces a flame, and descends immediately to the mouth of the phial, and there fixes itself and continues burning. But if the oil is heated to a greater degree, the steam burning to the last, out of the phial, without any flame or ignited body being applied, completely inflames itself, and takes the expansion of the flame.

CAUTION.

See that the mouth of the phial is rather narrow, that the phial may confine the fumes, lest by their largely and immediately mixing with the air, they lose their inflammable nature.

HISTORY.

The method of process of spirit of wine is this: it is excited by much less heat, and brings itself to expand sooner and more than water. It boils up with great bubbles without froth, and even with the raising of its whole body, but the

vapour, whilst it is collected, will on the application of fire produce fire, at a good distance from the mouth of the glass, not so bright (but at least as compact) as oil, but thin and scant of a blue colour and almost transparent. But being inflamed it is borne to the mouth of the glass, where is a supply of more copious fuel, as it is also with oil. But if the vapour is inflamed in the part verging a little obliquely from the mouth of the phial, the inflammation becomes pensile in the air, undulating or winding after the appearance of vapour, and would doubtless attend it longer if the vapour remained together and did not confound itself with the air. And the body itself of spirit of wine, if no remarkable vapour goes before, the fire being applied to it and kept to it a little while is changed into the flame, and it expands with so much the greater ease and swiftness, as the spirit is more widely diffused and occupies a less altitude. But if the spirit of wine is put in the hollow of the palm of the hand, and a lighted candle between the fingers is placed near the palm of the hand (as boys are wont to play with powder of resin), and the spirit is gently moved forward, and straight forward, not upward; the body itself burns in the air, and when burning sometimes descends in a right direction, sometimes unfolds a little cloud flying in the air, which nevertheless verges itself to descent; sometimes when set on fire it cleaves burning, to the roof or sides, or floor of the room, and gradually becomes extinct.

Vinegar, verjuice, wine, milk, and other simple liquors (I speak of vegetable and animal substances, for of minerals I will treat by themselves), have their modes of expansion, and some remarkable differences attending them, which it would be out of place here to enumerate: but they are in those natures which we have remarked in the processes of water, oil, and spirit of wine; namely, in the degree of heat; and mode of expansion, which is threefold, either in the whole body or in froth, or in rather large bubbles; for fat bodies, of unripe juice, as generally ascend in greater bubbles, of dried sap, as vinegar, in less. A collection of spirit moreover differs in its site. For in the boiling of wine, the bubbles begin to collect themselves about the middle, in vinegar about the sides: and it is the same in ripe and strong wine, and again in vapid or stale, when they are infused. But all liquors, even oil itself, before they begin to boil cast up a few and thin half bubbles about the sides of the vessel. And all liquors boil and are consumed quicker in a small than in a great quantity.

CAUTION.

I consider that compounded liquors are not proper to the history of the expansion and union of matter through the medium of fire, because they disturb and confuse the ratios of simple expansion and coition by their separations and mixtures. I leave them, therefore, for the proper history of the separation and mixture of matter.

HISTORY.

Spirit of wine put in an experiment with that elastic cap (which I described when speaking of water) obtains this sort of expansion. I find that a weight of six pennyweights consumed and dissolved into vapour filled and fully inflated a great bladder which could contain eight pints; which bladder was greater by sixteen times than that which I used in the case of water, which received only half a pint. But in the experiment of the water, there was a consumption of the weight of only two pennyweights, which is only the third part of six pennyweights. The ratios being thus calculated, the expansion of the vapour of spirit of wine bears a fivefold ratio and more to the expansion of the vapour of water. And that very great expansion did not keep the body, on the removal of the vessel from the fire, from hastening to recover itself, the bladder forthwith becoming red and remarkably contracted. And from this experiment I began to estimate the expansion of the body of flame on probable though not indisputable conjecture. For since the vapour of spirit of wine is so inflammable, and approaches so near the nature of fire, I considered that the ratios of spirit of wine compared with fire agreed with the ratios of the vapour of water compared with air. For we may suppose that the ratios of perfect and fixed bodies (as of air and fire) are in harmony with those of the elements or imperfect and moving bodies (as of vapours). And it will follow from this that fire exceeds air by five degrees in the rarity or expansion of matter. For such is the excess of their respective vapours as was before said. For the fire itself may bear the ratio of one and a half to the proper vapour, not the impure but the highly prepared vapour; as I have laid it down also that air can have the same ratio to the vapour of water highly prepared. And these experiments do not disagree materially with what we may frequently observe. For if you blow out a lighted wax candle, and mark the dimen-

sion of the smoky thread which ascends, (in the lowest part before it is dispersed), and place the candle near the fire, and again look at that portion of the fire which first reaches it, you will not imagine that it exceeds more than double the magnitude of the smoke. If you mark with accuracy the dimension of gunpowder, or for greater certainty measure it in a little box, and again take the dimension of its flame after it has been lit, you will readily grant that the flame exceeds the body (as far as it can be told at first sight) a thousand degrees. And from what has been before laid down, there should be a considerable proportion of fire according to the nitre. But this I will explain more perfectly in my observations upon this history. We very clearly see that air itself is expanded and contracted from heat and cold in those bodies of wind which physicians use for attraction. For these warmed over the fire, and then applied immediately to the body, draw the skin, the air contracting itself and gradually recovering itself. And this it does of itself, although the hemp may not have been put on and heated, which is used to produce a more powerful attraction. Moreover, if a cold sponge be applied outside over the blister the air contracts itself so much the more by virtue of the cold, and the attraction becomes more determined.

I have put a silver saltcellar of the usual bell-tower form, in a bath or goblet filled with water, bearing the air deprest with itself to the bottom of the vessel. I then put two or three live coals in the little hollow space in which the salt is placed when applied to its ordinary use, and raised a flame by blowing. Very soon after, the air, rarified by the heat, and impatient of its former orbit, lifted up the bottom of the saltcellar on one side, and ascended in bubbles. Hero describes an altar so constructed as that if you laid a holocaust upon it and set it on fire, suddenly water would fall to extinguish the fire. This might be accomplished by air being received under the altar in a hollow space closed up, and with no other way of exit (when the air was extended by the fire) but where it might force out the water prepared for this purpose, in the channel. There were lately in this country some Hollanders who had invented a musical instrument, which on being struck by the rays of the sun gave out a certain harmony. This was very probably owing to the extension of the heated air which could produce the motion of the instrument, since it is certain that air acted upon by the

contact of the very slightest heat, immediately begets expansion.

But in order to come at a more accurate knowledge of the expansion of the air let into that elastic bladder, I took an empty glass (I mean, filled only with air) and placed upon the bladder the cap of which I before treated. But when the phial was placed over the fire, the air extended itself more quickly and with less heat than water or spirit of wine, but with not a very ample expansion. For it bore this proportion. If the bladder held less by six ounces than the phial itself, the air completely filled and inflated it; it did not ascend easily on greater expansion; and no visible body proceeded out of it, after making a little hole in the top of the bladder, until it was inflated.

A. T. R.

DESCRIPTION OF THE INTELLECTUAL GLOBE.

CHAPTER I.

Division general of Human Learning into History, Poesy, Philosophy, according to the three Faculties of the Mind, Memory, Imagination, Reason; showing that the same Division holds also in matters Theological; since the Vessel, namely Human Intellect, is the same, though the matter contained, and the mode of its entrance, be different.

We adopt that division of human learning which is correlative to the three faculties of the intellect. We therefore set down its parts as three, History, Poesy, Philosophy:—history has reference to memory, poesy to imagination, philosophy to reason. By poesy in this place we mean nothing else but feigned history. History is, properly, the history of individual facts, the impressions of which are the earliest and most ancient guests of the human mind, and as it were the primitive matter of the sciences. To deal with these individuals and that matter forms the mind's habitual employment, and occasionally, its amusement. For all science is the labour and handicraft of the mind; poetry can only be considered its recreation. In philosophy the mind is enslaved to things, in poesy it is let

loose from the bondage of things, and breaks forth illimitably, and creates at will. And any one may easily comprehend that this is so, who shall seek the source of things intellectual even on the simplest principles, and with the most crass apprehension. For the images of things individual are admitted into the sense and fixed in the memory. They pass into the memory as it were whole, in the same manner as they present themselves. These the mind recals and retraces; and, which is its proper business, puts together and decomposes their parts. Now individuals severally have something in common one with another, and again something diverse and complex. Composition and division takes place either at the will of the mind itself, or agreeably to what is found in nature. If it is done at the mere volition of the mind, and such parts of things are arbitrarily applied, so as to form a certain likeness of some individual, it is the work of imagination; which, restrained by no law or necessity of nature or of matter, can unite things which in nature are most discordant, and divide those which never exist in separation, so as however this is still confined to such original parts of the individuals. For there is no imagination, not even a dream, of objects which have not in some shape presented themselves to the senses. Again, if the same sections of objects be joined or divided according to the real evidence of things, and as they actually present themselves in nature, or at least as they are observed to present themselves according to the general apprehension of mankind, this is the office of reason; and all such adjustment is ascribed to reason.

Whence it clearly appears that from these three sources there arise the three several streams of history, poesy, and philosophy, and that there cannot be other or more branches than these. For under the name of philosophy we comprehend all the arts and sciences, and whatever in short can, from the presentment of the several objects of nature, be by the mind collected and arranged into general notions. Nor do we think that there is occasion, in consideration of the extent of the subject, for any other division of learning than that which we have stated above. For though the responses of a divine oracle and of the senses are different, no doubt, both in the matter and the mode by which it finds access to the mind; yet the spirit of man which receives both is one and the same, just as different liquors passing through different apertures are received into one and the same vessel. Wherefore we assert that

history itself either consists of sacred history, or of divine precepts and doctrines, which are, so to speak, an every-day philosophy. And that part which seems to fall without this division, prophecy, is itself a species of history, with the prerogative of deity stamped upon it of making all times one duration, so that the narrative may anticipate the fact; thus also the mode of promulgating vaticination by vision, or the heavenly doctrines by parables, partakes of the nature of poetry.

CHAP. II.

A partition of History into Natural and Civil, Ecclesiastical, Literary, and Particular, included in Civil History. A division of Natural History into the History of Generations, Præter-generations, and Arts; according to the three states of Nature, namely, Nature in course, varying, and constrained.

History is either natural or civil. In natural history we recount the events and doings of nature; in civil, of men. Things divine no doubt have a conspicuous share in both, but chiefly in human, so as to constitute a branch of their own in history, which we are accustomed to call sacred or ecclesiastical. We shall therefore assign that branch to the province of civil history: and we shall first speak of natural history. There is extant no natural history of things individual. Not that we would lay down the false position that history ought to be engrossed with describing individuals, which are limited in time and place. For in that view it is proper there should be none; since, however, there is a general resemblance of natural objects, so that if you know one you know all, it were superfluous and interminable to speak of individuals. Thus if in any case that indistinguishable general resemblance be wanting, natural history admits individuals those, that is, of which there is not a number or family. For a history of the sun, the moon, the earth, and the like, which are unique in their species, is most properly written, and no less of those which conspicuously vary from their species and are monstrous; since the description and the knowledge of the species neither sufficiently nor competently supplies the want of it. Wherefore natural history does not exclude these two classes of individuals, but is in by far the largest

part of it, as we have already stated, employed about species. But we attempt a partition of natural history, derived from the tendency and condition of nature herself, which is found placed in three several states, and subject as it were to three modes of government. For nature is either free, spontaneously diffusing and developing itself in its wonted course, that is, when nature depends upon itself, in no way obstructed and subdued, as in the heavens, animals, plants, and all the natural productions; or again, it is evidently torn down and precipitated from its proper state by the pravity and erratic tendency of obdurate and resisting matter, or by violence of obstacles, as is the case in the care of monsters and unnatural productions; or, finally, it is coerced by the art and industry of man, fashioned, altered, and as it were made anew, as in things artificial. For in things artificial nature seems as it were new made, and there is seen a new face of things, or second universe. Wherefore natural history of either the liberty of nature or its errors into bonds. Now if it be unpleasing to any one that the arts should be called the bonds of nature, since they are rather to be considered its deliverers and champions, since they make nature in some instances mistress of her object, by reducing obstacles into her order. We regard little such delicacies and elegancies of language. We only mean to signify this, that nature, by means of arts, is placed by compulsion under a necessity of doing that which without arts would not have been done, whether that be denominated force and bonds, or assistance, and consummating skill. We shall therefore divide natural history into the history of generations, the history of preter-generations, and the history of arts, which we are accustomed to call mechanical and experimental history. And we willingly place the history of arts among the species of natural history, because these has obtained a now inveterate mode of speaking and notion, as if art were something different from nature, so that things artificial ought to be discriminated from things natural, as if wholly and generically different; whence arises this evil, that most writers of natural history think they have accomplished their task if they have achieved a history of animals, plants, or minerals, omitting the experiments of mechanics, which are of by far the greatest consequence to philosophy; and there has insinuated itself into mens' minds a still subtler error, namely this, that art is conceived to be a sort of addition to nature, the proper effect of which is

to perfect what nature has begun, or to correct her where she has deviated; but by no means to work radical changes in her, and shake her at the roots, which has been a source of great despondency in the attempts of men. Whereas, on the contrary, that ought to be sunk deep that things artificial do not differ from natural in form or essence but in efficients only; that in reality man has no power over nature, except that of motion, namely, to apply or to remove natural bodies; but nature performs all the rest within herself. Wherefore when there is granted a proper application or removal of natural bodies, men and art can do all; when not granted, nothing. Again, provided that due admission and removal takes place in order to some effect, it matters not whether it be done by man or by art, or by nature without man. Nor is the one more potent than the other; so if any one by sprinkling water create the apparition of a rainbow upon a wall, he does not find nature less obedient than when the same takes place in the air on humid clouds. Again, when gold is found pure in veins, where nature has performed exactly the same office to herself, as if pure gold were extracted by means of the smelting pot and ministry of man. Sometimes, too, a ministry of this kind is, by the laws of the universe, committed to other animals. For honey is not the less an artificial production, which is produced through the medium of the industry of the bee, than sugar which is produced by that of man; and in manna, which is a similar composition, nature is content with her own chymistry. Since then nature is one and the same thing, and its power all pervading and never at war with itself, these three things ought to be understood as equally subordinate only to nature; the course of nature, the eccentricity of nature, and art or man added to the universe, and therefore it is fitting that all these things should be interwoven in one continuous series of narrations, which Caius Pliny in a great manner attempted, who embraced natural history with a comprehensiveness of plan suitable to its dignity, but having embraced it, treated it most meagerly. Let this then be the first division of natural history.

CHAP. III.

A Partition of Natural History according to its use and end, showing that by far the noblest end of Natural History is its Ministration in the first instance to found Philosophy; and that such a History—a History modelled in order to such end, is wanted.

But Natural History, threefold in its subject (as we have stated), is twofold in its use. For it is employed either for the purpose of furnishing knowledge of those facts which are recorded by the history, or as the primitive matter of philosophy. But if the noblest end of natural history is this, that it is so to speak the stuff and *Hyle* of a just and legitimate induction, and draws enough from the sense to instruct the intellect. For that other sort of history, which either delights by the charm of the narration, or pleases by its subserviency to immediate experiments, and which is in request either in respect of such pleasure or such profit, is of a cast inferior, and in its nature meaner, in comparison with that of which it is the nature and the quality to serve as an appropriate preparation to found philosophy. For that is the true natural history which is established as an immoveable and eternal foundation for true and practical philosophy; which affords the first genial kindling to the pure light of nature, wherein all phantasms vanish; and of which the genius, neglected and unappeased by fit offerings, has, in an evil hour, sent among us those legions of spectres and worlds of shadows, which we see hovering over all the expanse of the philosophies,—along with great and lamentable dearth of useful works. Now we assert and explicitly testify, that a natural history, such as it ought to be in order to this end, is not possessed, but ought to be placed among histories wanting. And let not either the great names of the ancients, or the great tomes of the moderns, startle the mental vision of any one; and let him not think that our complaint is the less just. We are well aware, that there is extant a natural history, voluminous in its bulk, entertaining from its variety, often interesting, elaborate even to scrupulosity. But if one shall extract from it accounts derived from fable and antiquity, the quotations and testimonies of authors, the empty questions and controversies, and, finally, that part of it which is

mere words and rhetorical ornament (which is better adapted to disquisition and the talk of literary nights than to establish philosophy), this great appearance of substance subsides to nothing. Thus there seems to have been desiderated and collected by some men, in this instance, rather a Thesaurus for the allusions of eloquence, than a solid and authentic narrative of facts. Besides it seems to no great purpose to recount or know the wonderful varieties of flowers of the iris or the tulip, of shells, or dogs, or hawks. For these are nothing but the sport or wantonness of nature, and approach nearly the nature of individuals. By which means men acquire exquisite minuteness of knowledge in the objects, but meager and even useless information as respects the purposes, of science. Yet these are the things of which the common natural history makes such an ostentatious display. Now though natural history has, on the one hand, degenerated into foreign, and, on the other, indulged in superfluous inquiries, yet assuredly great and valuable parts of it have either been entirely passed over, or carelessly and lightly handled. And in the whole scope of its investigations and its accumulations, it is not by any means found adapted and qualified to attain the end of which we speak, namely, to found philosophy. This will appear best in its particular branches, and by a comparison of that history, whose descriptions we shall presently submit to the eyes of man, with that which now obtains.

CHAP. IV.

The Treatise begins by stating what the History wanted ought to be; namely, a Natural History, as a foundation for Philosophy. To unfold this more clearly, there is first exhibited a Scheme of the History of Generations. Of this the Parts are set down as five: The first, the History of the Heavenly Bodies; the second, of Meteors; the third, of Earth and Sea; the fourth, of the greater Colleges of things, that is of Elements or Masses; the fifth of the smaller Colleges or Species. The History of primitive Virtues is reserved, till the Exposition of the first Division, namely, of Generations, Preter-generations, and Arts, is completed.

As we think it concerns our honour not to leave to others the execution of the history which we desire, but to impose it as a task upon ourselves, since in proportion as the sub-

ject may seem open to the labour of all, in the same proportion, there is greater risk of their deviating from the design, and we have therefore distinguished it as forming the third part of our history; yet faithfully observe our purpose of explaining and exhibiting what hath been neglected, and place some part of science in security, should we be cut off by any of the accidents of humanity; we have thought it good to add now and in this place, our sentiments and counsels respecting this subject. We set down of the history of generations, or nature at large, five divisions. These are the history of the ether, the history of meteors and of the regions of the air as they are called; for the lower track circumambient to the earth's surface, and to the bodies which are placed in it, we refer to the history of meteors. Thirdly, there follows the history of the earth and sea, which conjointly compose one globe. And so far nature is divided according to place, and the things occupying those places. The other two parts discriminate substances, or rather masses of substances. For homogeneous substances are usually collected in larger or smaller masses, which we have been wont to name larger and smaller colleges of things, and they have the same relation as in human polity a tribe and family. Therefore we place the fourth in order, the history of the elements or larger colleges; fifthly and lastly, the history of species or smaller colleges. We mean elements to be taken in this sense, not that they should be understood as the principles of things, but as larger masses of connatural substances. That larger size happens by reason of the manageable, simple, obvious, and perfected texture of the matter; whereas species are furnished by nature sparingly, because of the dissimilarity, and in most instances, the organic structure of the texture. Now of the history of those properties which may be regarded as the cardinal and catholic virtues of nature, density, rarity, levity, gravity, heat, cold, consistency, fluidity, similarity, dissimilarity, specific, organic, and the like, along with the motions contributing to them, as of antitype, connexion, coition, expansion, and the rest of such properties and motions (the history of which we would have collected and complete before we come to the point, where the intellect is to work upon them), and of the mode of preparing that history; we shall discourse after finishing the explanation of the three divisions, generation, præter-generation, and arts. For we have not comprehended that among the three divisions, since it is not properly a history,

but something between history and philosophy, a sort of middle term. At present we shall speak and give our counsels respecting the history of the heavenly bodies, and then of the others.

CHAP. V

Resumes the consideration of the History of the Heavenly Bodies, showing what it ought to be in kind, and that the legitimate ordering of the History ought to turn upon three kinds of Precepts, namely, concerning the End of such History, the Matter, and Mode of conducting it.

We would have the history of the celestial bodies simple, not vitiated by arbitrary dogmas, but, as it were, suspended out of the reach of the forcible grappling and presumption of theories, only embracing phenomena raw and detached, which had grown up so to speak blended with such dogmas; finally, such a history as may set forth narratives of facts exactly in the same manner as if nothing had been fixed by the arts of astronomy and astrology, but only as if experiments and observations had been diligently collected and perspicuously described. In which kind of history we find nothing hitherto done to accord with our wish. Caius Pliny attempted only something of the kind in a cursory and inexact style; but a valuable history might be extracted and dug from the mine of Ptolemy and Copernicus, and the more informed teachers of astronomy, by exhausting all the experiments, and adding the observations of the moderns. And if it should appear to any one surprising, that we should throw back again what had been secured, enlarged, and rectified, to its primitive barbarism, and the simplicity of its crude observations, we answer thus; with none of the ostentation of the earlier inventors, we attempt a far nobler work, for we think not of calculations and predictions, but of philosophy—such, we mean, as shall instruct the human mind, not only with respect to the motion of the higher bodies and its periods, but concerning their substance, their various qualities, their power and influence, according to methods natural and admitting of no uncertainty, free from the superstition and childishness of tradition; and again, as respects their motion itself, to discover and unfold not what is reconcileable to known phenomena, but what is found on penetrating deep into nature, and is true in act

and in reality. And any one may easily observe both that those who have supposed that the earth revolves on its axis, and those, on the other hand, who have held it to be the centre of motion, the ancient formation, depend on a nearly balanced and doubtful advocacy of phenomena. Moreover, the advocate in our day of the new formation, who makes the sun the centre of the second motion, as the earth of the first, while the planets, in their respective orbits, seem to join in a dance round the sun, which some of the ancients suspected in the case of Mercury and Venus,—had he pursued his thoughts to their result, seems to have had it in his power certainly to bring the question to a fair settlement. Nor, indeed, have we any doubt that other hypotheses of such formations, may be invented by ingenious and acute thinkers. Nor are those who promulgate such theories much delighted, because what they propose is true, but only because it is a convenient hypothesis for forming calculations and astronomical tables. But our method has a widely different object. For we seek not accommodations which may be various, but truth, which is one. To attain this, a genuine history of phenomena would open a way; one tainted with theory would obstruct it. Nor shall we here omit, that we, as the result of such a history of the heavenly bodies, made and accumulated according to our rules, indulge not only the hope of a discovery of the truth with reference to the heavenly bodies, but still more of such discovery in the observation of the affections and appetencies of matter in either world. For that supposed discrepancy between the celestial and sublunary bodies appears to us a figment at once drivelling and presumptuous, since it is most indubitable that a variety of effects, such as expansion, contraction, impression, retrocession, assimilation, union, and the like, have their seat not merely among us, but in the highest part of heaven, and in the entrails of the earth. Other and more faithful interpreters than these there are none whom we can call in and consult, to assist human intellect in penetrating the depths of the earth, which are invisible, and the height of heaven, which is generally seen under optical illusion. Wherefore the ancients excellently devised of Proteus that he was of many shapes, and also noted as the prince of all diviners, knowing the past, the future, and the mysteries of the present. For he who knows the catholic appetencies of matter, and knows by them what is possible, cannot be ignorant what is, and what will be, found true of things taken

within them. Wherefore we repose great hope and confidence in the methods of physics for advancing the science of astronomy, meaning by physical inquiries, not those which are commonly thought so, but only the doctrine regarding those tendencies of matter which no diversity of regions or position can detach or dissever from it. Nor would we, therefore, (to return to our theme), wish any labour to be spared, which could be employed in statements and observations of the heavenly bodies. For in proportion as there is a richer fund of appearances of this sort, in the same proportion will the whole subject be more easily mastered, and have more solidity. Of which, before we say any thing further, we have reason assuredly to congratulate the world, both on the labour of mechanicians, and the diligence and accuracy of certain learned men, the[illegible] tempted so to speak, to establish by [illegible] ments, as by means of trading vessel[illegible] open up an intercourse with [illegible] this undertaking we regard as [illegible] something noble and worthy [illegible] are so much the more deserv[illegible] attempt and their basis of b[illegible] nestly and distinctly planted b[illegible] mination as they severally pres[illegible] only that they have perseveran[illegible] of judgment, that they change [illegible] increase the amount of eviden[illegible] periments each phenomenon, [illegible] variety of ways; finally, that th[illegible] selves and lay open to others, w[illegible] favour of the contrary conclusi[illegible] disdain to notice even the mos[illegible] that should happen to them whi[illegible] and his old woman about the [illegible] namely, to find the old wife w[illegible] and lest some silly and ridicul[illegible] the bottom of a high and soar[illegible]

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Having premised these remarks on the gene[illegible] subject, let us proceed to a more detailed statement of our astronomical history, in order that we may show both what, and what kind of facts, ought to be inquired into in regard to the heavenly bodies. First then we shall propose the questions of natural philosophy, or at least some of them, and those of greatest moment to the use of man. Next after these we shall mention those uses to mankind which may probably

be derived from the contemplation of the heavenly bodies: both of these as showing the design of the history: that those whose task it shall be to compile a history of the heavenly bodies may know what they do, and may have these questions, along with the works and practical effects to arise from them, in their minds' eye and contemplation. Whence they may build up and prepare a history such as shall be adapted for the decision of questions of this sort, and for furnishing such fruits and advantages to mankind. We mean questions of that kind which are applicable to the doings of nature, not their causes. For that is the proper province of history. We shall then perspicuously state in what the history of the heavenly bodies consists; what are its parts; what things are to be learned or examined; what experiments are to be set on foot and performed; what observations are to be used and weighed; thus proposing, so to speak, certain inductive topics or articles of examination respecting the heavenly bodies. Lastly, we shall state something not only concerning what ought properly to be inquired into, but concerning this,—how, when the inquiries are completed, they ought to be meditated, and exhibited, and reduced to writing; lest the diligence employed in the first part of the inquiry should be lost in what succeeds; or, which is worse, lest the advances subsequently made should proceed upon feeble and precarious foundations. Finally, we shall state both with what object, and what, and how, inquiry ought to be made respecting the heavenly bodies.

CHAP. VI.

That Philosophical Questions about the Heavenly Bodies, even though they go beyond the common ideas, and be somewhat difficult, ought to be canvassed. And there are proposed five questions about the System itself: whether it be a System? and, supposing it to be so, what is its Centre, what is its Depth, what is its Connection, and what its Distribution of Parts?

And now, doubtless, we shall be considered by some as disinterring the ashes of old questions, long, as it were, consigned to the dust of the grave; nay, as evoking their very ghosts, and urging them with fresh interrogatories of our own. But since the philosophy, hitherto in vogue,

respecting the heavenly bodies, has no solidity; and since this has been always laid down by us as a sacred and invariable rule, that all must abide the new award of a legitimate induction; and since, if perchance some questions are left behind us untouched, so much the less industry and pains will be exerted in collecting the facts upon them, in consequence of its appearing superfluous to inquire into points on which no question has ever been moved: we hold it necessary to take in hand all questions which the universe may any where offer to our consideration. Besides, in proportion as we are less assured of our ability to determine questions by the method we pursue, so much the more confidently do we entertain them. For we see how all must end.

The first question, then, is, whether there be a system, that is, whether the world, or universal frame of things, be a spherical whole, possessing a centre? or rather, whether the single globes of the earth and stars are placed in dispersion, and each attached, as it were, by its own root, without a common middle point or centre? The school of Democritus and Epicurus, it is true, made a boast that their authors had "broken down the walls of the world." Yet that, certainly, is not a consequence of the tenets maintained by them. For Democritus having laid down his notion of matter, or seminal atoms, infinite in number, limited in their properties and powers,—atoms in agitation, and from eternity unfixed in any possible structure or position, was not led, in virtue of that opinion, to maintain the existence of a number of worlds, distinguished by variety of form, subject to birth and dissolution, some better constructed, some more loosely coherent, also of embryo worlds, and agglomerations formed between world and world. But, were all this assumed, it hinders not that the portion of matter which has been assigned to the structure of this our world, lying, as it does, under our own observation, should possess a spherical figure. For, necessarily, each of those worlds must have taken some configuration. For allowing that in infinity there can be no central point, yet in the parts of that infinity there may exist a spherical figure, no less in a world, than in a mortar. Democritus, however, excelled only as an analyser of the world: in dealing with its aggregates and totality, he was inferior even to ordinary philosophers. The opinion of which we are now to speak, which really destroyed and exploded the notion of a system, was that of Heraclides of Pontus, Ecphantus and

Nicetas of Syracuse, and particularly of Philolaus, also in our age of Gilbertus, and all, (except Galileo), who have held that the earth is a planet, moves, and is, as it were, one of the stars. And this idea has solidity thus far, that the planets and single stars, and the countless number which from their distance baffle our vision, and others also unseen by us, from their being not of a luminous but opaque nature, each in its respective orbit and primary tour through that illimitable expanse which we behold, whether of vacant space or of some subtler and almost indiscernible substance, are dispersed and lie about like islands in a vast ocean, and revolve not upon a common centre, but each upon that of its respective orbit, some absolutely, others with some progressive motion of their own centre. There is one very great difficulty in their opinion, namely, that they altogether banish *rest*, or an immoveable point from nature. Now it seems that, as there are in nature revolving bodies which are borne along in interminable and ceaseless motion, so, on the contrary, there ought to be some body which is quiescent; between which we place the intermediate nature of those which are carried in a straight-lined path, since motion in a straight line is suitable to fragments of spheres, and things exiled, so to speak, from their natural seats, which move towards orbs homogeneous with themselves, in order that, united with these, they may either be rotatory or quiescent. But of this question, whether there be a system, a conclusion will be obtained by means of those which relate to and determine the motion of the earth, whether the earth revolve or be at rest, and to the matter of the stars, whether it be solid or igneous? For if the earth stands still, and the heavens perform a diurnal revolution, undoubtedly it is a system; but if the earth be rotatory, it is nevertheless not absolutely proved that it is not a system, because we may still fix another centre of the system, such as the sun, or something else. Again, if the orb of the earth alone is crass and solid, it seems as if the matter of the universe was agglomerated and condensed into that centre: but if the moon and other planets are found to be also composed of crass and solid matter, it seems that dense bodies do not unite in any centre, but lie dispersedly, and so to speak, at random. Finally, if in the interstellar spaces we place a *vacuum coacervatum*, then the several orbs should seem to have round them, first, the envelope of certain subtle effluvia, and then the vacuum. But if these spaces are a *plenum*, there should

seem to be a union of the denser in the centre, and an expulsion of the rarer substances, to the circumference. Now it contributes materially to science to know the connexions of questions with one another, because under some of them there is found history or inductive matter to furnish their solution, under others none.

But granting a system, next comes our second question, What is the centre of the system? For if to any of the orbs ought to be assigned the central place, there appear first to be two orbs which present the character of a middle point or centre—the earth and the sun. In favour of the earth there are our senses, and immemorial opinion, and most of all this circumstance, that as dense bodies contract into a narrow, and rare are diffused over a wide space, and the area of every circle contracts towards its centre, it seems to follow of necessity that the contracted part should be placed at the centre of the world, as the appropriate, and, as it were, the only place for dense bodies. For the sun again this reason makes, that to a body whose functions in the system are greatest and most potent, that place ought to be assigned from which it can best act upon, and diffuse its influence over the entire system. To this we may add that the sun evidently has as his satellites Venus and Mercury, and, in the opinion of Tycho, also the rest of the planets; so that the sun plainly appears to possess the nature, and to perform, in some instances, the office of a centre. Therefore we are brought so much nearer the determination that it is the centre of the universe, which was the assertion of Copernicus. But in the system of Copernicus there are many and great difficulties: first, there is something revolting to belief, in encumbering the earth with three motions, in detaching the sun from the group of planets with which it has so many common properties, in introducing so much immobility into the system of nature, (particularly by making the stars and sun immoveable, the bodies most luminous and sparkling of any), in wishing to fasten, as it were, the moon to the epicycle of the earth, and in some other assumptions which he makes;—savouring of the character of a man who thinks nothing of inventing any figment at the expense of nature, provided the bowls of haphazard roll well. But if we are to ascribe motion to the earth, it seems more consistent to banish the idea of a system, and of various globes conceived to be distributed over space, according to the idea of those whom we have already mentioned, than to estab-

lish such a system with the sun for its centre. And the consent of later ages and of antiquity has rather anticipated and sanctioned that idea than not. For the supposition of the earth's motion is not new, but, as we have already said, echoed from the ancients; but that of the sun being the centre of the world, and immoveably fixed, is entirely new, (if we except the supposed mention of it in an ill translated verse) and was first promulgated by Copernicus.

A third question follows with respect to the depth of the system, not that any exact measure of it can be taken, but that it may be set down for certain: whether the starry heaven is, so to speak, one region, or as it is commonly expressed, orb, or whether the stars which are denominated fixed, are higher than the others, in a sort of abysmal profound? For it cannot be that they are of equal height, if we understand this strictly; for the stars are undoubtedly not arranged as in a plane, having a certain measureable size on a superficies, like spots or embedded gems, but are entire globes, large, and lying deep in the profound. Wherefore when they are found of such disproportionate magnitude, it is by all means requisite that some of them should come out more than others, either upwards or downwards; nor can it be that either in the upper or lower part of them, they are joined in one continuous layer. Were this true of certain portions of the stars, it would be rash to assert it of them in their aggregate, that the stars are not higher placed the one than the other; but even though this were true, still we can affirm a defined and very perceptible depth or thickness of that region which is called the sphere or starry heaven, containing such projecting points and varieties of altitude; for we see, from the apogees and perigees of the planets, that there belongs to their several heavens a certain distinguishable depth through which they mount and descend. But that question only regards this point,—whether there are stars one above another as planet above planet, and, as it were, in different orbits? And that again is in like manner collateral to the other question, regarding the motion or condition of the earth. For if the stars revolve with a diurnal motion about the earth, since they are all carried with the like celerity, and as it were with the one impulse; and since it is plainly apparent that each of the planets, as it varies in height or lowness of position, so it also varies in rapidity or slowness of motion;—it is probable that stars, equal in the swiftness of their revolution, are placed in one region of

ether, of which although the thickness or depth may be supposed considerable, still it is not so great as to create a difference in their incitation or celerity, but only such, that through the whole of each region respectively, all the bodies revolve simultaneously as if fastened with the chain of one common essence, or, at least with such discrepancy as, by reason of the distance, is not brought within our vision. Now, if the earth moves, the stars may either stand still (as Copernicus thought), or, which is far more probable, and was suggested by Gilbertus, they may revolve each in its place, round its own centre, without any motion of that centre, (as the earth does, if you divide its diurnal motion from those two supposed motions which Copernicus has superadded to it). For whichever of these is the fact, it hinders not that there may be stars ranged one above another, till they escape our vision.

The fourth question relates to the cohesion of the system, or to the substance connecting it. As to the nature and essential properties of that body or thing which is thought to be pure ether, and is interfused between the stars, we shall presently inquire. We shall now speak only of the principle of cohesion in the system. There are three modes of viewing this. For we must either grant a vacuum, or a substance whose parts are in contact, or lastly, in continuity. Our first inquiry is, whether there is an extent of absolute vacuity or a *vacuum coacervatum* in the interstellar space, which Gilbertus ably maintained, and which several of the ancients appear to countenance, who supposed that the various orbs were scattered about without any regular system, especially those who declared the bodies of the stars to be compact masses. Such an opinion amounts to this, that all the globes, as well the stars as the earth, consist of solid and dense matter. That they are enveloped, next their surface, with a certain description of bodies, which are so far homogeneous to their respective globes, but nevertheless more thin, feeble, and attenuated, and which are nothing but effluvia or emanations from the globes themselves, such as are vapours and exhalations, and air itself, if compared with earth. That these effluvia reach to a distance not considerable round each several globe, and that the rest of the interval between the globes, which is incomparably the largest part, is a void. Which opinion we may be prepared to adopt by the fact, that the bodies of the stars are visible from such a prodigious distance. For were the whole of that space full, especially of bodies

extremely unequal in their degrees of density and rarity, so great would be the refraction of their rays that they could not be propagated to our vision, which, if by far the greatest portion of this space were unoccupied, it is consistent to believe they might be. And, indeed, this question seems to depend, in a great measure, on the question which we shall immediately bring forward respecting the substance of the stars, whether it be dense, or subtle, or expanded? For if their substance be solid, it should certainly seem as if nature were only occupied and in action about these globes, and their boundaries, and had neglected, and as it were left fallow, the interposed spaces. Wherefore it is not improbable that the globes are, towards their centres, more compact, towards their surface more lax, in their circumambient substances and effluvia grow less substantial still, and finally terminate in a vacuum. On the other hand, if the essence of the stars is subtle and igneous, it will be manifest that the nature of rare is not merely privative, but of itself a powerful and primary element, not less than the nature of solid, and that it exists in force or prevails in the stars, in ether, and in the atmosphere, so that there is need of the hypothesis of a *vacuum coacervatum.* That question, too, about a vacuum in the interstellar fields will depend upon another connected with the great principles of nature: whether we must admit a vacuum at all? And this not without modifying it by a distinction: for it is one thing to deny a vacuum absolutely, and another to deny a *vacuum coacervatum.* For much more solid reasons may be alleged for a *vacuum intermistum* being interposed to keep bodies in a certain degree of laxity, than for maintaining a *vacuum coacervatum* (or large vacant spaces). And not only was that ingenious man, and great mechanician Hero sensible of this, but also Democritus and Leucippus, the inventors of the theory of a vacuum, which Aristotle attempts to attack and overthrow by certain logical subtleties. These two most acute and famous philosophers admit a *vacuum intermistum* in such a manner as to exclude a *vacuum coacervatum.* For according to the opinion of Democritus every vacuum is so limited and circumscribed as not to admit of the separation or disruption of bodies beyond certain limits, no more than it does of their contraction and consolidation. Though in what has been preserved of the writings of Democritus, this is no where propounded explicitly, yet he seems to say this, that bodies, as well as spaces, are infinite, that otherwise (that is, if there were in fact

infinite space and finite bodies), bodies would never cohere: therefore on account of coinfinity of matter and space a vacuum is necessarily compressed into certain limits; which seems to have been his opinion, truly and accurately understood; in other words, that certain limits must be set to the developement or expansion of bodies through the permeating vacuum; not granting a vacuum apart, or space unreplenished with body. But if there cannot be admitted in the system, a vacuum of the nature of a solution of continuity, yet seeing there is found in the parts or portions of the system so extreme a diversity of bodies that they seem to be of different races and countries, there arises a second question which relates to the connection of the system; it is this, whether pure ether be one entire or unbroken stream, or whether it consist of a variety of contiguous parts? Now it is no part of our character to subtilize about words: but by a contiguous body we understand one which lies upon, without being amalgamated with, another body. Nor again do we mean some impenetrable or hard superstratum, such as the astronomers in general mean, but one such as fluids exhibit, in the instance of water floating on the top of quicksilver; oil, of the water; air, of the oil. For no one can doubt that in the immense expanse of ether there are immense differences in rarity and density, and in many other properties: but granting either, that is a plenum or vacuum, this may equally be the fact. For it is sufficiently certain that not even in the sea itself, the water at the top and at the bottom is of the same consistency and taste; and, in the air, there is extreme difference between the air contiguous to the earth, and the upper air, and yet it is one entire and unbroken liquid body. The question is therefore brought to this point: whether the differences in the tract of pure air, as it were, insinuate themselves in a continuous stream of imperceptible gradations, or are distributed and arranged into defined and conspicuous limits, where bodies are joined in their locality, which could not be amalgamated, even as among us air lies on water. For to one who considers the matter simply, the whole of that clear and limpid substance in which the globes of the earth and sun are suspended and float, and which, being interposed between those globes, by its quantity and the space which it occupies, exceeds the dimension of the globes, so to speak, innumerable times,—is a thing undivided and perfectly united within itself. But to one who looks into nature more correctly, this will plainly

appear, that nature is wont to make her way from one locality to another, now by steps, anon abruptly by leaps, and then reverses the progression. Otherwise, if any one really looks into the case, there could be no structure, no organized figure, did nature always proceed by imperceptible degrees. Wherefore this process by gradations may be fitly placed in the intervals between worlds, but not in a world, to the organization of which it is required that things much dissimilar should be severed the one from the other, and yet brought into close contiguity. Thus it is that the air embraces and is in contact with the earth and waters, a body widely different, and yet placed in proximity, not in the order of, first, earth, then vapour or fog, then pure air, but air at once without an intermediate body. And in the air and ether two substances we usually join with one another, the most conspicuous and thorough diversity of all may be observed, from their quality being more or less susceptible of a starry nature. There appear therefore to be three regions most distinctly lying between the earth and the highest point of heaven: that is, the region of the air, the region of the planetary heaven, and the region of the starry heaven. Now in the lowest region the substance of the stars is not found, it exists in the middle in the form of conglobation into certain orbs, but in the highest heaven it is dispersed into numberless globes, so that in its highest region it seems to migrate, as it were, into the pure empyreum. Meantime, that must not be forgotten, which we mentioned a little before, that nature is accustomed to alternate fine gradations and distinct transits in her processes, so that the confines of the first communicate with the second, and of the second with the third. For in the upper air, after the air has begun to be purified from the effluvia of the earth, and refined by the vicinity of the heavenly bodies, flame searches out its way and struggles into form; as we see in the lower kind of comets, which are of an intermediate nature between the steady and an evanescent sidereal nature. And again, the part of heaven near the sun appears to grow stellescent, and to pass into a starry essence. For those maculæ which are discoverable, by a faithful and careful observation of the sun, are a sort of germ or rudiments of starry matter; and in the heaven about Jupiter there are also visible complete and perfect stars, though, from their minuteness, invisible without the help of telescopes. And again, in the upper parts of the starry heaven, from num-

berless scintillæ in the ether between the fixed stars, (for which other sufficiently unmeaning reasons are given), the starry essence seems to be more diffused and spread out continuously. But of these points we shall say more in discussing those questions, which we presently propose to consider, respecting the substance of the stars and the interstellar ether. For what we now say relates only to questions respecting the connexion of the system.

A fifth question remains concerning the distribution of the parts of the system, or the order of the heavenly bodies. And granting that there is not a system but only scattered globes, or granting that there is a system the centre of which is the sun, or even allowing the astronomers to go in quest of some new system, still there remains equally this inquiry: What planet is nearer or more distant from any other planet? and in like manner what planet is at a greater or less distance from the earth, or even from the sun? Now if the system of the ancients is admitted, there seems no reason why we should attach great importance to any new inquiry concerning the four higher heavens, namely, those of the fixed stars, of Saturn, Jupiter, and Mars. For their position and order are testified by the suffrage of all antiquity, and by the absence of any contradictory phenomenon; their modes of revolving also, whence is derived our principal evidence of the relative heights of the heavenly bodies, are adapted to this structure, and no where interfere with it. But as to the Sun, Venus, Mercury, and the Moon, even on the principles of the old system, there was some doubt among the ancients; and among the moderns it is still a question, with respect to Venus and Mercury, which planet is higher than the other? For in favour of the superior height of Venus this reason offers itself, that it moves somewhat more slowly; and of Mercury, that it is fixed at a nearer distance from the sun, whence one should naturally maintain that it ought to be placed next the sun in height. But, as to the moon, no one ever had any doubt that its place was next the earth, though there was a difference of opinion with regard to its approaches to the sun. Nor ought one question relating to the arrangement of the system to escape a serious inquirer into the subject, which is this, whether the planets alternately pass over and pass below one another? which seems to be authenticated in the case of Venus by elaborate demonstrations of the fact that it is found sometimes placed below the sun, sometimes above it. And doubtless

also this is an apt question: whether the deflection of the lower planet does not cut the orbit of the higher planet, and enter within its periphery?

There remains our last question concerning the collocation of parts in the system, that is, whether there be several and different centres in the system, and several choral bands, so to speak, moving around them; especially since the earth is affirmed to be the centre of primary motion; since the sun (in the opinion of Tycho) is the centre of secondary motion; and even Jupiter is made, by Galileo, the centre of the inferior and lately discovered motion of certain satellites.

These then are the questions which it seems fitting to propose with respect to the celestial system: namely, whether there is a system, and what is its depth, what its connexion, and what is the order of distributing its parts. As to the outermost parts of heaven, and what has been termed the empyrean heaven, we enter into no theories or inquiries. Therefore what can be known of it can be learned only from inference, not at all by induction. For such inquisition, therefore, there will both be a fitting time, and a specific plan and mode.

As respects the heaven of heavens and pure space, we are bound entirely to stand by, and submit to, revelation. For as to what has been said by the Platonic school, and lately by Patricius, (in order, forsooth, to exalt themselves to a diviner height in philosophy), and said not without gross and visionary extravagance, the ravings, as it were, of a disordered mind;—in short, advanced with extreme audacity and no result, like the *acones* and other dreams of Valentine, these we regard as mere figments. For we are not tamely to submit to the apotheosis of folly, like that of the Emperor Claudius. It is worse than all other evils —the very pestilence and death of intellect—to attach reverence to its chimeras.

CHAP. VII.

The following are Questions relating to the Substance of the Heavenly Bodies; viz. What Species of Substance is that of the Heavenly Bodies generally, compared to Sublunary Bodies;—the Substance of the interstellar Ether compared to the Body of a Star;—the Substance of the Stars themselves compared to one another, and compared to our Fire, and in its proper Essence;—and what Species of Substance is that of the Galaxy, and of the opake Maculæ visible in the Antarctic Hemisphere? Then the First Query is set forth, Whether there is a diversity of Substance between Bodies celestial and sublunary, and in what it consists?

HAVING finished our inquiries respecting the system, we must now proceed to those which regard the substance, of the heavenly bodies; for it is the substance of the heavenly bodies, and the courses of their motion, that philosophy chiefly seeks to know. Astronomy investigates their real motion itself and its properties—both astronomy and philosophy their influence and effect.

Care ought to be taken, however, accurately to distinguish between astronomy and philosophy: astronomy preferring those hypotheses which are most convenient for shortening the method of calculation; but philosophy those which most approximate to the truth of nature:—further, that, on the one hand, the hypotheses of astronomy do not in any way prejudge truth; and on the other, the positions of philosophy be such as are perfectly tenable upon the phenomena of astronomy. Whereas, on the contrary, the fact now is, that the figments of astronomy have insinuated themselves into philosophy, and perverted it; and the theories of philosophers about the heavenly bodies are reconcileable only to themselves, and in a great measure abandon astronomy, contemplating in general the system of the heavens, but by no means accommodating themselves to particular phenomena and their causes. Thus while either science, such as we now have them, is a thing superficial and perfunctory, the foot must be planted more vigorously by far on this foundation—that these two sciences, which, by reason of the contracted speculations of men, and the practice of academic teachers, have been

habitually disconnected for so many ages, are one and the same thing, and concrete in one body of science.

Therefore we propose it as our first question, Whether or not there is a diversity between the substance of the heavenly bodies and that of this lower orb? For the premature and dogmatical doctrine of Aristotle has created for us only an *imaginary* heaven, formed of a certain fifth essence without change and also without heat. And waiving for the present any discussion respecting the four elements which this quintessence takes for granted, it was certainly a piece of great temerity to annihilate all affinity between the elementary substances as they are called, and the heavenly bodies; when two of the elements, namely air and fire, agree so well with the star and the ether; but it was the custom of that great man to abuse his genius, create work for himself, and prefer the obscure. Not, however, that there is any doubt that the regions situated above and beneath the moon, along with the bodies comprehended within the same limits and space, differ in many important particulars. Nor again is this more certain than that in the bodies of each region there exist many tendencies, affections, and motions common to both; so that, preserving unbroken the unity of nature, we ought rather to discriminate than to pluck them forcibly asunder. And as regards one part of the supposed discrepancy, namely, that the celestial bodies are imagined to be eternal, the sublunary perishable, that doctrine seems to be a fallacy either way, as neither that eternity which they fancy is true of heaven, nor that mutability of earth. Indeed to one who justly weighs the matter, a judgment ought by no means to be formed from those things which are visible to us, since none of the objects which meet the human eye are dug or cast up from a greater depth than about three miles at most, which is as nothing compared to the diameter of the earth. Therefore nothing hinders that the interior part of the earth may be endowed with a like eternity to heaven itself. For if the earth were subject to changes in its womb, it is impossible that the results of those changes should not produce greater calamities on the surface of it which we tread, than we see taking place. For of those changes which present themselves conspicuously to us here in the direction of the surface of the earth, there is generally some visible and apparent cause acting from above, such as tempests, rains, heat, and the like; so that the earth of itself, and of its own virtue,

seems to furnish the cause of almost none of its changes. If it is conceded, (which indeed is not improbable), that the earth itself too, and not heavenly bodies only, acts upon the fields of air, either by an efflux of cold, or by emitting winds, or some other similar modes, still all that variety is ascribed only to some portions of the earth in immediate contact with the air itself, in which none will deny there exists a multitude of changes and vicissitudes. But it must be fully admitted that, of the phenomena of the earth, earthquake enters the deepest by far into its bowels; and, which are of the same class, gushes of water, volcanoes, fissures and convulsions of the earth and the like, which notwithstanding do not seem to rise from a great depth, since most of them generally affect but a certain limited portion of the earth's surface. In proportion as an earthquake affects a larger space on the earth's surface, in the same proportion we are to infer that its roots and source enter deep into the mass of the earth; and the contrary, in proportion as it is less extensive. But if any one should allege that there sometimes happen earthquakes which shake large and extensive tracks of country,—no doubt it is so. Yet these rarely occur, and are among the number of the greater calamities of the species, and may therefore be compared to the higher order of comets, which are also of rare occurrence. For we do not now discuss whether eternity absolutely may be affirmed of the earth, but would make it appear, as we stated at the commencement, that with reference to constancy and mutation there is no great difference between heaven and earth. We do not consider it worth while to contend for the eternity of the earth from the modes of its motion. For it were superfluous to argue eternity from the properties of motion, since, if a circular motion is without a limit, so is rest: eternity may equally be predicable of the coherency of compact and large masses of homogeneous substance, as of the rotation of rarer bodies; the parts detached from either flying off in right lines.

This also may be assumed in reasoning upon the point, that the internal parts of the earth are not more exposed to decay than heaven itself; because something generally perishes of that body wherein something can be repaired. Now when showers, and substances which are precipitated from the air, and which renew the upper surface of the earth, in no way find a passage into the interior parts of the earth, which nevertheless remain fixed by their own

gravity and magnitude, it follows of necessity that nothing is substracted, since there is nothing added to succeed it. Finally, that changeableness which we discover in the outmost portion of the earth seems itself to be only accidental. For that slight crust of the earth, which appears only to dip a few miles downwards, (within which limits are contained those admirable laboratories and workshops of plants and minerals), would by no means afford so great a variety, much less of such beautiful and high-wrought productions, unless that part of the earth was exposed to action, and ceaseless vellication, from the bodies above. Now if any one think that the warmth and action of the sun and heavenly bodies can transverberate the thickness of the whole earth, such a man may be justly regarded as a superstitious and phrenetic dreamer, since it is clearly seen with how small an impediment they may be refracted and kept out. Thus far of the indissolubility of the earth. Let us now inquire of the changeableness of the heavenly bodies.

First then, we are not to use this mode of reasoning, namely, that mutations do not take place in heaven, because they do not come within our own observation. For remoteness of distance, excess or want of light, and fineness or minuteness of substance, equally baffle vision: thus, if the eye were placed in the orb of the moon, it could not discern those changes which take place amongst us here on the surface of the earth, such as inundations, earthquakes, structures, or huge masses, which at so great a distance are not equal to the size of a gnat.

Nor should any one from the circumstance of the interstellar air of heaven being transparent, and the stars on a clear night appearing of the same number and form, pronounce too readily, that the entire body of the ether is diaphanous, firm, and immutable. For the atmosphere itself is subject to endless varieties of heat, cold, scents, and every sort of amalgamation with subtler vapours, yet does not therefore lose its pellucid quality: so in like manner we are not to trust to that feature and aspect of heaven. For if those huge masses of clouds which occasionally cover the heavens, and take from our sight the sun and stars, on account of their nearness to our point of vision, were suspended in the upper part of the atmosphere, they would by no means change the appearance of a serene sky: for neither could they be seen themselves on account of the distance, nor cause any obscuration of

the stars, on account of the smallness of their size, compared to the magnitude of the stars. Besides the body of the moon itself, except in the part in which it receives light, does not alter the appearance of the sky, so that were that light annihilated, so large a body would entirely escape our view. But, on the contrary, it is clearly apparent from those bulky bodies, which by their mass and magnitude overcome the effect of distance, and on account of their luminous or sparkling substance forcibly strike our view, that surprising changes and anomalies happen in the heaven. And that is perceived in the higher order of comets, I mean those which assume the appearance of a star without the *coma*, and which are not only proved by the doctrine of parallaxes to be placed above the moon, but bear a certain and unchangeable relation of position to the fixed stars, and retain their stations without being erratic; of such our age has seen more than one, first in Cassiopæa, and afterwards not long ago in Ophiuchus. And as to this kind of regularity, which is seen in such comets arising from their following the motion of some star (which was the opinion of Aristotle, who asserted that there was a like relation of a comet to the motion of a particular star, and of the galaxy to that of the stars collectively, both positions being false), that has now been long exploded, not without a stigma on the genius of Aristotle, who in his airy speculations had the presumption to invent such things. Nor in fact does this change in the heavenly bodies with respect to such new stars, obtain only in those stars which appear to be of a vanishing nature, but also of those which remain in their place. For in the instance of the new star of Hipparchus, of the appearance of which mention is made among the ancients, there is none made of its disappearance; a new star has lately become visible in the breast of Cygnus, which has now continued for twelve entire years, exceeding the duration of a comet, which it has been held to be, by a considerable period, and not yet lessened in disk, or threatening to disappear. Nor again, is it properly and invariably true, that the old stars are not subject to change, but only the stars of later Epiphany, in which it is not to be wondered if change takes place, since their very production and commencement is not immemorial. For passing over that fable of the Arcadians with respect to the first appearance of the moon, in which they boast that they are of greater antiquity than that planet, there are not wanting in history

sufficiently authenticated facts on the subject, as when the sun three several times,—without the occurrence of an eclipse, or the intervention of clouds, appeared in a clear and serene sky, changed in appearance for many days, and yet not affected in the same way each time, being once of slender light, and twice of a ferruginous colour. For these phenomena took place in the year 790, during seventeen days, and in the time of Justinian during half a year; and after the death of Julius Cæsar, during several days. To that obscuration we have still extant that noted testimony in Virgil:—

> Ille etiam extincto miseratus Cæsare Romam
> Cum caput obscura nitidum ferrugine texit,
> Impiaque eternam timuerunt sæcula noctem.

And the statement of Varro, a most skilful antiquarian, to be found in Augustine respecting the planet Venus, to this effect, that in the reign of Ogyges it changed its colour, size, and figure, might well have been doubted, had not a similar fact occurred again, signalised by much observation in our own days, in the year 1578. For then, too, during a whole year, a memorable change took place in the planet Venus, which was seen of unusual size and brilliancy, exceeding in redness even the planet Mars, and more than once changed its figure, becoming sometimes triangular, sometimes square, and sometimes circular, so that even its very body and substance seemed to be affected. Again, that star among the old stars, placed in the hip of Canicula, which Aristotle says he himself saw, having some coma, which he particularly noted, vibrating when he looked at it intently, appears to be since then changed and to be divested of its hair, since no trace of that appearance is found on it in our day. Add to these facts that many alterations of the celestial bodies, particularly of the smaller, from neglecting to make observations, easily escape notice, and are lost to us. Now it will readily occur to a sciolist to ascribe such appearances to exhalations and the constitution of the medium of vision; but these alterations, which are found to affect such a body continuously and equally for a considerable time, and to accompany it in its revolutions, ought to be placed altogether to the account of the star itself, or at least something in the ether contiguous to it, not in the lower tracks of the air; of which we may assume this as a strong argument, that such changes rarely occur, and at long distances of years, but those which take place in the atmosphere by the interposition

of vapours more frequently. And if any one forms a judgment from the regularity of the heavenly bodies, and the equability of the motion itself, that the heaven is immutable, and should set down the exactness of their periods and renewals as a distinct mark of their eternity,—seeing constancy of motion seems scarcely compatible with a perishable substance,—he ought to advert a little more attentively to this, that such a periodical reappearance, as if in a cycle, at stated intervals, may be even found among ourselves in several things, particularly in the tides of the ocean; besides, smaller variations which may obtain among the heavenly bodies, their dates and renewals, escape our vision, and baffle our calculations. Nor ought the revolution of the heavenly bodies in a circle to be taken as a better proof of their eternity, because, forsooth, there is no end to impulsion in a circle, and an immortality of motion is agreeable to an immortality of substance. For even the secondary comets, which have their place lower than the moon, perform revolutions, and that from a property of their own; unless we are to give credit to the figment of their being attached to stars. For if we will argue the eternity of the heavenly bodies from their circular motion, that ought to be referred to the entire system of the heavens, not to its parts; for the atmosphere, the sea, and the land, are eternal in the totality, perishable in the parts. Besides, on the contrary, we ought not to presume the motion of the heavenly bodies from their revolving motion, because that very motion is not a perfect one, nor renewing itself absolutely in an exact and pure circle, but with declinations, eccentricities, and ellipses. Moreover, if any one should retort upon us the observation we made respecting the earth, in stating that those changes which occurred in it were accidental not substantial, and arose from the action upon it of the heavenly bodies, and should assert that the relation of heaven is directly contrary, since the heaven can in no way be reciprocally influenced by the earth, and any efflux from the earth falls short of the sphere of the heavenly bodies; so that it is probable that heaven, placed aloof from all action adverse to its durability, is susceptible of eternity of duration, since it is not at all agitated or infringed upon by an antagonist substance; this seems an objection not to be despised. For we are not likely persons to defer to the childish notion of Thales, who conceived that the heavenly bodies absorbed the exhalations raised by the earth and sea, and were therewith fed

and repaired; (since these exhalations generally fall in a like quantity as they have mounted, and are by no means enough to refresh both the earth and the spheres of heaven, nor by possibility extend to such a height); yet notwithstanding, though the gross evaporations of the earth stop far short of heaven, if the earth be the "*primum frigidum*" (principle of cold), according to the doctrine of Parmenides and Telesius, it would not be easy or safe for any one to affirm to what height this force, the antagonist and rival of that of heaven, penetrates by a gradual and successive approximation; especially as these substances imbibe and propagate to a great distance the nature and effects of heat and cold. Yet granting that heaven is not affected by earth, that is no objection why the heavenly bodies should not mutually suffer action and change one from another; the sun for instance from the stars, the stars from the sun, the planets from both, all from the interposed ether, particularly that circumambient to the several spheres. Besides, the opinion of the eternity of heaven appears to have derived great force from that mechanism and fabric of heaven, which the astronomers have busied themselves to very little purpose to invent. For they seem to have taken infinite trouble to guard against the opinion that the heavenly bodies suffer any influence but the effect of mere rotation, being in other respects unchangeable and imperturbable. They have therefore nailed up, as it were, the stars in their orbits. And in their several deflections, elevations, depressions, and windings, they have detected as many perfect circles of the just diameter, elaborately paring and smoothing both the convex and concave side of these circles, so that there is found in them no projection or abruptness; but the one being received within the other, and, by reason of its smoothness of curve, placed in exactly the proper contiguity, yet so as to slide easily into one, move serenely and kindly; which immortal system of impulses easily precludes all agitation and disturbance, the precursors of dissolution. For, doubtless, if bodies so great as are the starry orbs while cutting the ether, do not always continually describe the same paths in its expanse, but pass through regions and tracks far removed from one another, sometimes ascending the upper fields of space, sometimes descending towards the earth, sometimes directing themselves to the south, sometimes to the north, there is imminent danger that numerous impressions, shocks, reactions,

and recoils, should take place in these bodies, and that from these should arise the condensations and rarefactions of substance which prognosticate and breed productions and alterations. But since from physical considerations, and, moreover, from the phenomena themselves, it will hold that this latter position is the truth, and that the former fictions of astronomers, if any one looks at them soberly, in reality mock nature, and are found empty of facts: it is consistent that the notion,—their concomitant,—of the eternity of the heavenly bodies, should incur the same censure. And if any one should make religion an objection, we would have him thus answered; that it was the boast of the heathens to attach eternity only to the heaven and the sun, but that sacred scripture ascribes it equally to heaven and earth. For there we read not only that "the sun and the moon bear faithful witness in heaven;" but that all "generations come and pass away, but the earth remaineth for ever." And we find the fleeting and perishable nature of both coupled in one and the same oracle; "heaven and earth shall pass away, but my word shall not pass away." Then if any should insist, that nevertheless it cannot be denied, but that on the surface of the earth, and the contiguous parts, innumerable changes take place,—not in heaven; we meet the objection thus: that we do not make them equal in all respects; and yet, if we take the upper and lower regions of the air, as they are called, to be the surface or exterior coat of heaven; even as we regard that space among ourselves, within which animals, plants, and minerals are contained, as the surface or outer garment of earth, there too we find numerous and manifold productions. Wherefore it seems as if all collision and disturbance took place only on the frontiers of heaven and earth, as is frequently the case in matters civil, when the inland provinces of two neighbouring countries enjoy continued peace, and are only thrown into commotion by the more rare and formidable kinds of war.

And with respect to that other part of the supposed heterogeny of the heavenly bodies, as maintained by Aristotle, that they are not subject to heat, lest perchance the conflagration dreaded by Heraclitus might be the result, but that they are warmed, *per accidens*, by the friction and diverberation of the air; we do not understand what this straggler from experience means, contradicting too, as he does, the sense of antiquity on the subject. But it is nothing wonderful to find *that man** divorcing any given sub-

* Aristotle.

ject from experience, and presently turning away in a sort of scorn from nature,—at once pusillanimous and audacious. Of that however we shall presently speak, when we come to the question, "whether the stars are real fires," and more largely and correctly in our counsels respecting the History of Virtues, where we shall discourse of the sources, and cradles of heat and cold, as yet unknown to and untouched by man. Thus we have stated the question with respect to the heterogeny of the heavenly bodies. For though, perhaps, the case demands that we should condemn, without postponing the conviction, the doctrine of Aristotle, it is not consistent with our purpose.

Another question proposed was, what that substance is contained in the interstellar spaces? These are either a void as Gilbertus conceived; or filled with a substance, which is to the stars what air is to flame, the hypothesis most closely approaching the experience of our senses; or filled with a substance essentially the same with that of the stars themselves, luminous, and to a certain degree empyrean, but of a secondary order, being of a light not so brilliant and coruscating, which seems to be meant by the received opinion that a star is the denser part of its own sphere. For there can be no objection to conceiving it a bright transparent medium, for conveying stronger light. Telesius has acutely observed, that common air contains within itself a certain quantity of light, using this argument, that there are certain animals which see by night, whose visual organs are adapted to receive and kindly entertain this weak sort of light. For it is a less credible supposition that a visual act takes place without any light, or from the internal illuminating power of the spirit. And even flame itself is seen diaphanous, to such a degree as to give out the form of opaque substances, as is seen in the wick of candles, much more to be the vehicle for the form of more intense light. For the flame of tallow or wax is more lustrous, and, if we may use the expression, more igneous; but the flame of spirits of wine is more opaque, and as it were more aeriform, so that the flame is not inspissated. And I also made an experiment on this subject, which was done by taking a wax candle and raising it in a sconce, (using a metal one for the purpose of protecting the body of the candle from the flame, which was to be circumfused), and placing the sconce in a goblet in which was a small quantity of spirits of wine, and first lighting the candle, and then igniting the spirits of wine;

when you might clearly see the radiating and white light of the candle in the midst of the flame of the spirits of wine, which was weak, and approaching to a mere pellucid medium. And in like manner there are often seen in the heavens luminous belts, affording a distinctly visible light of their own, vividly illuminating the darkness of the night, through the substance of which, however, the stars are plainly discernible. And that difference between a star, and the interstellar air is not justly described by the terms rare and dense, that is by the star being denser, the ether rarer. For generally here among us flame is a body subtler than the air, I mean more expanded, and having in it less matter for the space it occupies, which may probably obtain also in the heavenly bodies. It is a gross mistake, if they really suppose the star to be a part of a sphere in which it is fastened, as it were, by a nail, and the ether a vehicle in which it is carried. For either the body of the star cuts the ether, or the ether itself is carried round in the same rotation. This notion, then, is a mere invention, like that fabric of orbs upon orbs which they describe. For if they revolve otherwise than simultaneously, it is still necessary that the star cut the ether. For that supposed arrangement of adjacent orb, so that the concave of the outer falls in with the convex of the interior orbit, yet on account of the curve of both, the one does not interfere with the other in its revolutions, though differing from its own, has no foundation in fact; since the body of the ether is unbroken, just as that of the air is: and yet because of the great varieties found in each, their various regions are most properly discriminated for the purpose of instruction. Wherefore the sixth question, according to this our explanation of it, is a fit subject for inquiry.

Then follows another question, and not an easy one, with respect to the substance of the stars themselves. We first inquire whether there be other globes or masses of solid and impacted matter besides the earth itself? For the theory is proposed without any extravagance, in our treatise *De Facie in Orbe Lunæ*, that it is not probable, that in the distribution of matter, nature had bound up whatever solid matter there was in the globe of the earth, since there is such a host of other orbs of a sublimated and expanded matter. And Gilbertus carried this theory so extravagantly far, (in which however he had several precursors, or rather guides among the ancients), as to assert not only

and has not a conspicuous magnitude, and an intense, strong light, escapes the eye, and makes no difference in the face of heaven. Nor let it strike doubt into the mind of any less informed inquirer, if the question suggests itself, whether globes of consolidated matter can remain pensile? For the earth itself floats pensile in the midst of its circumambient air, the softest of substances, and huge volumes of watery clouds and magazines of hail are long suspended in the fields of air, and are rather precipitated than spontaneously descend, before they begin to be affected by the earth's contiguity. Wherefore Gilbertus has very well noted that heavy bodies, when carried to long distances from the earth, are gradually divested of their motion towards the objects beneath, arising from no other propension of bodies, than that of uniting and conglomerating to the earth (which is a collection of homogeneous substances), and of which the influence terminates with its own sphere. For as to what is asserted of a motion to the earth's centre, that would be a sort of *potent nothing* dragging to itself such large masses; whereas body cannot be affected except by body. Wherefore let this inquiry concerning solid and opaque globes, although it appear new, and to common apprehension difficult, be entertained; and let another be associated with it, the old and undecided one, which of the stars give forth a light original and from themselves, and which from the illumination of the sun; the one class appearing to be connatural to the sun, and the other to the moon.

Finally, we understand all investigation concerning the difference of substance among the stars relatively to one another, a multifarious subject, as it seems,—since some are red, some leaden, some white, some manifestly always brilliant, others nebulous,—to refer to our seventh query. It is another question, whether the stars are real fires, which question notwithstanding requires a degree of consideration rightly to comprehend it. For it is one thing to say, that the stars are real fires, and another that the stars, supposing them to be real fires, exercise all the properties and perform all the effects of common fire. Not that we are, therefore, to have recourse to the idea of an abstract and imaginary fire retaining the name of fire, but rejecting its properties. For our fire, if placed in ether in such a quantity, as the quantity composing a star, would perform different operations from those which are observed on earth; since things acquire far different properties, both

from their quantity, and their position or collocation. For the bulkier masses, that is the homogeneous bodies, which are combined in a body of such quantity as to have analogy to the whole of the universe, acquire cosmical properties, which are no where found in their parts. For the ocean, which is the greatest collection of water, ebbs and flows, but marshes and lakes not at all. So in like manner the whole earth remains pendent, a portion of the earth falls. And the position of a body is of great importance, both in its bulkier and smaller portions, on account of the proximity or contiguity of bodies friendly and hostile. Much more, then, must a diversity of action obtain between our fire and that of the stars, because it differs from it not only in the quantity and composition, but also in some degree in substance. For the fire of the stars is pure, uncompounded, and native: whereas ours is degenerate, crippled by its fall like Vulcan precipitated to earth. For if one observe it, we have fire among us as if out of its place, flickering, surrounded with its contraries, poor, and, as it were, begging the alms of nourishment to preserve it, and hastening to disappear. But in heaven fire exists in its true state, dissevered from the encroachment of its contrary, and performing freely, and without disturbance, its appropriate actions. Therefore it was not at all necessary for Patricius, in order to save the pyramidal form of flame as found among us, to insinuate that the higher part of a star might be pyramidal, though the other part, which is visible to us, be globular. For the pyramidal form of fire is incidental to it from the pressure and confinement of the air. Therefore, in flame, the base is fuller, the apex pointed, but in smoke the lower part narrow, the top broadened, and like an inverted pyramid: because air expands to smoke, but compresses fire. It is, therefore, consistent that flame among us should be pyramidal, in heaven globose. In like manner flame among us is a shortlived body, in ether steady and lasting. But even among us flame would remain and subsist in its own form, were it not destroyed by the surrounding substances, which is very apparent in the larger sort of flames. For every portion of flame placed in the midst of flame perishes not, but remains unextinguished, the same in quantity, and rapidly ascending heavenwards; but on the sides the pressure takes effect, and from them begins the process of extinction. One way of demonstrating this fact, I mean the interior flame remaining in a spherical figure, and the exterior gradually vanishing and

forming a pyramid, is by an experiment of two flames of different colours. There may also be very great difference between the heat of flame in the heavenly bodies and in ours. For the celestial flame expands freely and serenely, as if in its own medium, ours, as if pent up in another, blazes and rages. For all fire hedged about and imprisoned becomes fiercer. In fact the rays of the fires of heaven themselves, after reaching denser and more impenetrable bodies, lose their mild quality and become more scorching. Wherefore Aristotle ought not to have apprehended Heraclitus's conflagration for his sphere, even although he had determined that the stars were real fires. This question then may also be entertained subject to this explanation.

Another question follows, Whether the stars are kept alive by due sustentation? and also, whether they are increased, lessened, generated, extinguished? and in fact one of the ancients supposed, from some vulgar observation, that the stars were nourished as fire is, and fed upon the waters, the sea, and the moisture of the earth, and were sustained by their evaporations and exhalations, a notion which seems unworthy to supply matter for any inquiry. For such vapours fall far on this side the height of the stars. Nor is there such a quantity of them as to supply the waters and the land by rains and dews, and besides suffice for repairing so many and so great heavenly orbs, especially as it is evident that the earth and ocean have not suffered diminution in the quantity of liquid for many ages, so that it seems a necessary conclusion that as much is replaced as is absorbed. Nor is the mode of supply so suitable for the heavenly bodies as it is for our fire. For where something perishes and is subtracted, there too something is taken up and assimilated. This species of assimilation resembles the *tartarizations* of salts, and derives its source from the contiguity all round it of opposite or dissimilar substances. But in the consubstantial and interior body of the stars nothing of the kind happens, no more than in the bowels of the earth, but they preserve their substance by the law of identity, not assimilation. But with respect to the exterior surface of the starry bodies the question is properly enough proposed; whether they remain in one and the same state, or steal from and even taint the surrounding ether? And in this sense we may inquire also respecting the aliment of the stars.

But it is proper here to subjoin the question with respect

to the increase and lessening of the stars as bodies, though the phenomena which may occasion uncertainty on the subject are very few.

For first of all, no instance, or any analogous facts in human experience favour the inquiry; since our globe of earth and water does not seem subject in its mass to any conspicuous augmentation or diminution, but preserves its bulk and quantity. But, it may be said, the stars appear to our view sometimes of larger, sometimes of smaller size. This is true, but that larger or smaller dimension of a star is ascribable either to its proximity or remoteness; or in their apogees and perigees, in the case of the planets; or to the constitution of the medium of vision. So far as this arises from the constitution of the medium, it is easily discriminated, because that changes not the appearance of one star in particular, but of all equally: as happens on winter nights in a keen frost, when the stars appear of increased magnitude, because the vapours of the earth both mount in less quantity and are dissipated more powerfully, and the whole body of the atmosphere is to a certain degree condensed, and approaches an aqueous or chrystalline character, which exhibits objects in increased dimension. But if it were some particular intervention of vapours between our vision and some given star, magnifying the appearance of the star (which we frequently and plainly see happening in the case of the sun, and moon, and other heavenly bodies), that appearance can neither impose upon us in itself, nor does the star follow and move with the body of the vapour, but is quickly extricated from it, and resumes its usual appearance. But though these things are so, yet since both formerly, in ancient times, and now also in our own age, a great change, much noted and celebrated, has taken place in the star Venus, in its magnitude, colour, and even figure; and since a change which always and regularly attends a given star, and is seen to move about with its body, ought to be considered as necessarily existing in the star itself, and not in the medium of vision; and since, in consequence of the neglect of observations, many remarkable phenomena, which take place in heaven are passed by unheeded, and are lost to us:—we think it right to entertain this second branch of our question.

Of the same kind is another part of our inquiry, whether, during the long lapse of ages, stars are produced and decomposed? not but that the multitude of facts which invite this question is more copious and sufficient, than on that

of their increase, though they be only of one kind. For as respects the ancient stars, no one in the memory of all ages has remarked the rise of any of them (except what the ancient Arcadians fabled about the moon), and none of them has been missed: whereas, with respect to those which are regarded as comets, but of a stellar form and motion, and in fact as new stars, we have both witnessed, and learned from the ancients, their appearances, and disappearances: while to some they seemed, in the latter, to waste away; to others, to be taken up (as if they had descended towards us in their circuits, and afterwards returned to the higher regions); to others, to be gradually rarified and dissipated in ether. But the whole of our inquiry respecting the new stars we refer to that place in which we speak of comets.

Another question remains, that with respect to the galaxy, whether the galaxy be a collection of the smallest of the stars, or a combined body and region of the ether of an intermediate substance between that of the ether and the stars. For that theory about exhalations has itself now long exhaled, not without fixing a brand on Aristotle's genius, who had the audacity to put forth such a figment, fastening upon a thing so invariable and fixed an evanescent and fluctuating character. But an end of this question as proposed by us seems to be easily attainable, if we are to give credit to the accounts of Galileo, who has arranged that confused luminous appearance into numbered and mapped constellations. For that the galaxy does not prevent the visibility of those stars which are found within its limits, is not enough to settle the question, nor to incline the matter either way. It only refutes, perhaps, the notion that the galaxy is placed lower than the part of ether containing the stars; for if this were the case, and the continuous body had also some depth of itself, it is consistent with reason to suppose that our vision would be prevented. And if it were placed at the same altitude as the stars which are visible in it, there is no reason why stars should not be scattered about in the galaxy itself, not less than in the rest of the ether. Thus we have treated of this question. These six questions then refer to the substance of the heavenly bodies; what, namely, is the substance of heaven in general, what of the interstellar air, what of the galaxy, and what of the stars themselves, whether compared with one another, or with our fire, or with their own essence?

But with respect to the number, magnitude, configuration, and remoteness of the stars, with the exception of the phenomena and historical inquiries, of which we shall speak by and by, the problems which philosophy offers are generally simple. With respect to their number, too, there follows another question: whether that be the true number of the stars which is visible, and which has been set down and described by the labours of Hipparchus, and comprised within the plan of the celestial globe. For it is but a barren reason which is assigned for the incalculable number of stars, usually hid, and as it were imperceptible, which are commonly seen in winter, particularly in clear nights, namely, that these appearances are not smaller stars, but emanations, scintillæ, and as it were darts emitted by known stars; besides, there has been a new enumeration of the host of heaven by Galileo, not only in that cohort which is distinguished by the name of the milky way, but also amidst the stations and system of the planets. Now stars become imperceptible either on account of the minuteness of their size, or their opacity (the term tenuity we do not much approve of, since pure flame is a body of the most subtle tenuity), or on account of their remoteness and distance. The question with respect to the superflux of stars, created by the production of new ones, we refer to the part which treats of comets.

As regards the magnitude of the stars, the visible magnitude belongs to the general phenomena, the real to the philosophical inquiry comprehended only in our twelfth problem: What are the real dimensions of each star, either discovered by measurement, or, if not, by comparison? for it is easier to discover and demonstrate that the globe of the moon is less than the globe of earth, than that the globe of the moon is a mile round. We must then use all trial and exertion to ascertain their exact dimensions; if these cannot be had, we must make use of their comparative.

Now the magnitudes of the stars are either taken and inferred from their eclipses and obscurations, or from the bounds to which they extend their light, and the other properties which each of these bodies, in proportion to their magnitude, emit and propagate; or, lastly, by the harmony of the universe, which confines and limits, by a certain necessity, the parts of the homogeneous bodies. For we must not rest upon the accounts given by astronomers of the bare magnitude of the stars, (though they have

laboured in that attempt, seemingly with great and exact minuteness, yet in reality with no little license and temerity); but must seek, if any present themselves, proofs and evidence more to be trusted to and more genuine. Now the magnitude and distance of the stars reciprocally indicate each other by the methods of optics: the roots of which science, however, ought to be a little shaken.

The question of the true magnitude of the stars is the twelfth in our enumeration: there follows another respecting the form, whether they be globes, that is, masses of matter of a solid round figure? Now there are apparently three figures of the stars; spherical and comose as the sun; spherical and angular, as the stars, (the coma and angles relate here only to aspect, the spherical form only to substance); spherical only, as the moon. For no star looks oblong, or triangular, or square, or of any other figure than the above. And it appears to be the order of nature that the larger accumulations of things, for their own preservation and a truer union of parts, impact themselves into globes.

The fourteenth question relates to distance: What is the true distance of any star in the abyss of heaven? For the distances of the planets, both relatively to one another and to the fixed stars, are consequent upon, or determined by, their motions in the path they describe through the heavens. But as we have said above concerning the magnitude of the stars, if an exact and directly measured magnitude cannot be had, we must have recourse to their comparative magnitudes:—we give the same precept as to their distance, that if the distance cannot be accurately taken, (for instance, from the earth to Saturn and to Jupiter), yet let it be set down at least as certain, that Saturn is of greater altitude than Jupiter. For the system of the heavens interiorly, that is, the common arrangement of the planets with reference to their heights, is not unchallenged, nor were the opinions that now obtain formerly believed. There is even now a controversy respecting Mercury and Venus, which of them is higher. The distances are found either by their parallaxes, or their eclipses, or their modes of motion, or the differences of their visible magnitude. Other helps must also be obtained for this inquiry, which man's industry will suggest. The question, also, with regard to the thickness or depth of the spheres, is connected with these distances.

W. G. G.

OF THE EBB AND FLOW OF THE SEA.

The investigation of the causes of the ebb and flow of the sea, attempted by the ancients and then neglected, resumed by the moderns, but rather frittered away than vigorously agitated in a variety of opinions, is generally with a hasty anticipation, directed to the moon, because of certain correspondences between that motion, and the motion of that orb. But to a careful inquirer certain traces of the truth are apparent, which may lead to surer conclusions. Wherefore, to proceed without confusion, we must first distinguish the motions of the sea, which, though thoughtlessly enough multiplied by some, are in reality found to be only five; of these one alone is eccentric, the rest regular. We may mention first the wandering and various motions of what are called currents: the second is the great six-hours motion of the sea, by which the waters alternately advance to the shore, and retire twice a day, not with exact precision, but with a variation, constituting monthly periods. The third is the monthly motion itself, which is nothing but a cycle of the diurnal motion periodically recurring: the fourth is the half monthly motion, formed by the increase of the tides at new and full moon, more than at half moon: the fifth is the motion, once in six months, by which, at the equinoxes, the tides are increased in a more marked and signal manner.

It is the second, the great six-hours or diurnal motion, which we propose for the present as the principal subject and aim of our discourse, treating of the others only incidentally and so far as they contribute to the explanation of that motion.

First then, as relates to the motion of currents, there is no doubt that to form it the waters are either confined by narrow passages, or liberated by open spaces, or hasten as with relaxed rein, down declivities, or rush against and ascend elevations, or glide along a smooth level bottom, or are ruffled by furrows and irregularities in the channel, or fall into other currents, or mix with them and become subject to the same influences, or are affected by the annual or

trade winds, which return at regular periods of the year. That in consequence of these and similar causes, they vary their states of flow and eddy, both as relates to extending and widening the motion itself, and to the velocity and measure of the motion; and thus produce what we term currents. Thus in the seas the depth of the basin or channel, the occurrence of whirlpools or submarine rocks, the curvature of the shore, gulfs, bays, the various position of islands, and the like, have great effect, acting powerfully on the waters, their paths, and agitations in all possible directions, eastward and westward, and in like manner northward and southward; wherever, in fact, such obstacles, open spaces, and declivities exist in their respective formations. Let us then set aside this particular, and, so to speak, casual motion of the waters, lest it should introduce confusion in the inquisition which we now pursue. For no one can raise and support a denial of the statement which we are presently to make, concerning the natural and *catholic* motions of the seas, by opposing to it this motion of the currents, as not at all consistent with our positions. For the currents are mere compressions of the water, or extrications of it from compression: and are, as we have said, partial, and relative to the local form of the land or water, or the action of the winds. And what we have said is the more necessary to be recollected and carefully noted, because that universal movement of the ocean of which we now treat is so gentle and slight, as to be entirely overcome by the impulse of the currents, to fall into their order, and to give way, be agitated, and mastered by their violence. That this is the case is manifest particularly from this fact, that the motion of ebb and flow, simply, is not perceptible in mid sea, especially in seas broad and vast, but only at the shores. It is therefore not at all surprising that, as inferior in force, it disappears, and is as it were annihilated amidst the currents; except that where the currents are favourable, it lends them some aid and impetuosity, and on the contrary where they are adverse considerably restrains them. Waiving then the motion of the currents, we proceed to the four regular motions; that in the six hours, in the month, in the half month, and in six months, of which the sexhorary motion alone seems to produce and develope the ordinary tide, the monthly to determine that motion and define its renewal; the half monthly and half yearly to increase and strengthen it. For the ebb and flow which cover

and quit again a certain extent of shore, both vary at various hours, and according to the momentum and quantity of the water; whence these three other motions are rendered more perceptible.

We must therefore contemplate, singly and specifically, as we purposed, the motion of ebb and flow. And first it is necessary to grant that this motion, the subject of inquiry, is one of these two: either the motion of an *elevation* and *depression*, or the motion of a *progression* of the waters. The motion of elevation and depression we understand to be such as is found in boiling water, mounting and subsiding alternately in a caldron: the motion of progression to be such as is observed in water carried in a basin, which quitting the one side, is projected to the opposite. Now that the motion we treat of is not of the former sort, is in the first place suggested by this fact, that in different parts of the world the tides vary according to the times, so that in certain places there are floods and accumulations of the mass of waters, in others at the same hours ebbs and diminutions. Now the waters, if they did not travel from place to place, but rose ebullient from the bottom, ought to rise every where at once, and to subside together. For we see those two other motions, the monthly and half monthly, in full movement and operation, at the same periods throughout the globe. For the waves increase at the equinoxes in all parts, not in certain places under the equator, or in others under the tropics: and the same is true of the half monthly motion. For every where over the world, the waters are elevated at new moon and full moon, no where at half moon. The waters therefore are manifestly raised, and again depressed in these two motions, and like the heavenly bodies have their apogees and perigees. But in the ebb and flow of the sea, which we now discuss, the contrary takes place, an unequivocal sign of progressive motion. Besides ere we set down the flow of the sea as an elevation of the waters, we ought to consider a little more carefully how that elevation can take place. For the swelling must either be produced by an augmentation of the mass of waters, or from an extension or rarefaction of fluid in that mass, or from simple elevation of the mass or body. The third supposition we must dismiss entirely. For if the water united in the same body were lifted up, a vacuum would necessarily be left between the earth and the under face of the water, there being no body ready to succeed and supply

its place. If there were a fresh quantity of water added, it must be by flowing and eruption from the earth. If there were dilatation only, this must take place either by solution into greater rarity, or by a tendency to approach another body, which as it were evokes the waters, attracts them, and lifts them to greater elevation. And, doubtless, that state of the waters, whether considered as ebullition, or rarefaction, or harmony with some one or other of the heavenly bodies, cannot seem incredible, that is to a moderate extent, and on the supposition of the lapse of considerable time, in which such swellings and accretions may gather and accumulate. Therefore the difference observable between the ordinary, and the half monthly tide, or the most copious of all, the half yearly one, in which the addition to the mass of waters, is not equal to the difference between ordinary ebb and flow, and has besides a large interval of time insensibly to form, may, on the hypothesis of *elevation* and *depression*, be consistently explained. But that so great a mass of water should burst forth as to explain that difference which is found between the ebb and flow, and that this should take place with such extreme rapidity, namely, twice a day, as if the earth, according to the fantastic notion of Apollonius, performed respiration, and breathed waters every six hours, and then again inhaled them, is very hard to believe. And let no man be misled by the unimportant fact that in some places wells are said to have a simultaneous motion with the ebb and flow of the sea, whence one might conjecture, that waters inclosed in the entrails of the earth boil up in like manner, in which case that swelling of the waters cannot be attributed to a progressive motion. For the answer is an easy one, that the flow of the sea by its encroachment may perforate and gorge many hollow and loose places of the earth, turn the course of subterraneous waters, or cause a reverberation of the inclosed air, which by a continued series of impulsions may raise the water in this sort of wells. Accordingly this does not take place in all wells, nor even in many, which ought to be the case if the entire mass of waters had a property of periodically boiling up, and a harmony with the tide. But on the contrary, this rarely happens, so as to be regarded almost as a miracle, because in fact such apertures and spiracles as reach from wells to the sea, without circuity or impediment, are very rarely found; nor is it unimportant to mention, what some relate, that in deep pits situated not far from the sea, the air be-

comes thick and suffocating at the time of ebb, from which it may seem manifest, not that the waters boil up, (for none are seen to do so), but that the air is reverberated. No doubt there is another objection, not despicable but of great weight, every way deserving of an answer, one which has been the subject of careful observation, and that not incidentally, but a thing specially and of purpose inquired into and discovered, namely, that the waters at the opposite shores of Europe and of Florida ebb at the same hours from both shores, and do not quit the shore of Europe when they roll to the shore of Florida, like water (as we have said before) agitated in a basin, but are manifestly raised and depressed at either shore at once. But a clear solution of this objection will be seen in the observations which shall presently be made about the path and progression of the ocean; the substance, however, is this; that the waters, setting out in their course from the Indian ocean, and obstructed by the remora of the continents of the old and new world, are impelled along the Atlantic from south to north; so that it is no wonder if they are driven against either shore equally at the same time, as waters are wont to be, which are propelled from the sea into estuaries and up the channels of rivers, evidently showing that the motion of the sea is progressive as respects the rivers, and yet that it at once inundates both shores. Notwithstanding, according to our custom we freely confess, and would have men observe and remember, that if it is found in experience that the tide advances at the same time on the coast of China and Peru, as on that of Europe and Florida, this our opinion, that ebb and flow is a progressive motion of the sea, must be repudiated.

For if the flow of the sea takes place at the same time at the opposite shores, as well of the Pacific or Southern Ocean as of the Atlantic Ocean, there are not in the universe any shores remaining, at which a corresponding ebb, at the same time, might afford a satisfactory solution of the objection. But we propose with confidence of a trial of this by experiment, to whose test we submit our cause: for we are clearly of opinion, that were the general result of a trial of this fact through the world known to us, this compact of nature would be found effected on sufficiently reciprocal conditions, namely, that at any given hour as much reflux took place in some parts of the world as flow in others. Therefore, from what we have stated, this motion of ebb and flow may be affirmed progressive.

Now follows the inquiry, from what cause and what combination of things this motion of ebb and flow arises and is presented to view. For all the great movements (if these be regular and perpetual) are not isolated, or (to use here an expression of the astronomers) *ferine*, but have something in nature with which they move harmoniously. Therefore those motions, as well the half monthly one of increase as the monthly of reparation, appear to accord with the motion of the moon; and again the half monthly, or equinoctial, with the motion of the sun; also the elevations and depressions of the water, with the approximation and revolution in the orbits of the heavenly bodies. Notwithstanding, it will not immediately follow from this, and we would have men note the observation, that those things which agree in their periods and curriculum of time, or even in their mode of relation, are of a nature subjected the one to the other, and stand respectively as cause and effect. Thus we do not go so far as to affirm, that the motions of the sun ought to be set down as the causes of the inferior motions which are analogous to them; or that the sun and moon (as is commonly said) have dominion over these motions of the sea, although such notions are easily insinuated into our minds from veneration of the heavenly bodies; but in that very half monthly motion, if it be rightly noted, it were a new and surprising kind of subjection to influence, that the tides at new and at full moon should be affected in the same manner, when the moon is affected in contrary ways; and many other things might be instanced, destroying similar fancies of this sort of dominant influence, and leading to this inference that those correspondencies arise from the catholic affections of matter, from the primary concatenation of causes, and connexion of things; not as if such were governed the one by the other, but both flowed from the same sources and from joint causes. Notwithstanding this, however, it remains true, as we have said, that nature delights in harmony, and scarcely admits of any thing isolated or solitary. We must therefore look, in treating of the sexhorary ebb and flow of the sea, with what other motions it is found to agree and harmonize. And first we must inquire with respect to the moon, in what manner that motion blends relations or natures with the moon. But this we do not see prevail except in the monthly repairing of the moon, for the periodical course of six hours has no affinity with the monthly course; nor again are the tides

found to follow any affections of the moon. For whether the moon be crescent or waning, whether she be under the earth or above the earth, whether her elevation above the horizon be higher or lower, whether her position be in the zenith or elsewhere, in none of these relations do the ebb and flow of the tide correspond with her.

Therefore, leaving the moon, let us inquire concerning other correspondencies; and from all the motions of the heavenly bodies, it is certain that the diurnal motion is the shortest, and is accomplished in the least period of time, that is, in the space of twenty-four hours. It is therefore in harmony with this, that the motion of which we inquire, which is yet three times shorter than the diurnal one, should be referred immediately to that motion which is the shortest of the heavenly ones. But this notion has no great weight with us in this matter. Another hypothesis has more influence with us, that this motion is so distributed that though the motion of the waters is slower by innumerable degrees, still it is referable to a common measure. For the space of six hours is a quarter of the diurnal motion, which space (as we said) is found in that motion of the sea with a difference coinciding with the measure of the moon's motion. Whereupon this belief sinks deep into our mind, and looks as it were an oracular truth, that this motion is of the same kind with the diurnal motion. With this, therefore, as a basis, we shall proceed to a thorough inquiry: and we think that the whole subject is exhausted in three points of investigation.

The first is, whether that diurnal motion is confined within the regions of heaven, or descends, and penetrates to the lower parts? The second is, whether the seas move regularly from east to west as the heaven does? The third, whence and how that six hours' motion of the tides takes place which coincides with a quarter of the diurnal motion, with a difference falling in with the measure of the moon's motion. Now, as relates to the first inquiry, we think that the motion of rotation, or of turning from east to west, is not properly a motion merely of the heavenly bodies, but manifestly of the universe, and a primary motion in all the great fluids, found to prevail from the highest part of heaven to the lowest part of the waters, in direction the same in all, in impulse, that is, in rapidity and slowness, widely different; in such wise, however, that in an order not in the least confused, the rapidity is diminished in proportion as the bodies approach the globe of the earth.

Now this, it seems, may be taken as a probable reason for supposing that that motion is not limited to the heavens; because it prevails and is in force through so great a depth of heaven as lies between the starry heaven and the moon, (a space much more extensive than that between the moon and the earth), with a regular diminution; so that it is probable that nature does not at any point abruptly break off a harmonious motion of this kind, diffused through such vast spheres and gradually lessening. And that this is so in the heavenly bodies is evinced by two inconsistencies, which follow from the opposite hypothesis. For since the planets visibly perform a diurnal motion, unless we are to suppose that motion natural and self-moved in all the planets, we must unavoidably have recourse for an explanation either to the supposition of the primum mobile, which is evidently opposed to nature; or to the rotation of the earth, which is a notion extravagant enough, if we look to the methods of nature. Therefore the motion exists in the heavenly bodies. And, quitting heaven, that motion is most distinctly visible in the inferior comets; which, though lower than the orb of the moon, evidently move from east to west. For though they have their solitary and eccentric motions, yet in performing them they for a time have a common movement, and are borne along with the motion of the ether, and with the same conversion: but in the tropics they are not generally so confined, nor move in the regular course, but sometimes straggle towards the poles, yet nevertheless pursue their rotatory motion from east to west. And thus this motion, though it suffers great diminution, since the nearer it descends towards earth the conversion is performed in smaller circles, and more slowly, still remains powerful, so as to traverse great distances in a short time. For these comets are carried round the whole circumference, both of the earth and the lower atmosphere, in the space of twenty-four hours, with an excess of one or two hours more. But after, by a continued descent, it has reached these regions upon which the earth acts, this motion, not only by the communication of the earth's nature and influence, which represses and lowers circular motion, but also by a substantial immission of the particles of its matter, by means of vapours and gross exhalations, becomes infinitely relaxed, and almost falls off, yet it is not therefore wholly annihilated or ceases, but remains feeble and verging to imperceptible. For mariners now begin to confess that between the tropics, where, in

the open sea, the motion of the air is best perceived; and where the air itself, as well as heaven, revolves in a larger circle, and therefore more rapidly, that a perennial and gentle breeze blows from east to west, insomuch that those who wish to use the south west wind often seek and avail themselves of it outside the tropics. Consequently this motion is not extinguished, but becomes languid and obscure, so as to be scarcely perceptible outside the tropics. Yet even outside the tropics, in our own part of the globe, Europe, at sea, in serene and peaceful weather, there is observed a certain wind, which is of the same species; we may even conjecture that what we experience here in Europe, where the east wind is sharp and dry, and, on the contrary, the south west winds are cherishing and humid, does not depend merely on the circumstance that the one blows from a continent, the other from the ocean, but on this, that the breath of the east wind, since it is in the same train with the proper motion of the air, accelerates and heightens that motion, and therefore disperses and rarifies the air; but that of the west wind, which is in the contrary direction to the motion of the air, makes it rebound upon itself, and become inspissated. Nor ought this to be neglected, which is admitted into the number of common observations, that the clouds which are in motion in the upper part of the air generally move from east to west; while the winds about the earth's surface generally blow at the same time the contrary way. And if they do not this always, the reason is this; that there are some times opposite winds, some acting on the high, others on the lowest, exhalations. Now those blowing on high, if they be adverse, confound the real motion of the air. It is sufficiently clear, then, that the motion is not confined within the limits of heaven.

Then follows in order the second inquisition: Whether the waters move regularly from east to west. Now when we speak of waters, we mean those accumulations or masses of waters which are such large portions of nature as to have a relation of harmony to the fabric and system of the universe. And we are fully of opinion that the same motion is natural to, and inherent in, the body of waters, but is slower than in the air; though, on account of the grossness of the body, it is more palpable and manifest. Of this we shall content ourselves with three selected from many experimental proofs, but these weighty and marked ones, which prove that this is so.

The first is that there is found a manifest motion and flow of waters from the Indian ocean, even to the Atlantic, and that more swift and strong towards the Straits of Magellan, when an outlet is opened to them westwards; and a great current also on the other side of the world from the northern ocean to the British sea. And these currents of waters manifestly roll from east to west; in which fact we must note in the first place, that in those two places alone the seas find thoroughfares, and can describe in flowing a complete circle: whereas, on the contrary, at the central regions of the globe, by the two ramparts of the old and new world, they are thrown off and driven (as it were into the estuaries of rivers) into the basins of the Atlantic and Pacific, the two oceans extending between the south and north, and open to the motion of a current from east to west. So that the true course of the waters is most safely inferred from the extremities of the globe, as we have stated, where they meet with no impediment, but sweep round in full circuit. And the first experiment is thus, the second is the following.

Let us suppose that the tide takes place at the mouth of the Straits of Gibraltar at any given hour: it is certain that the tide sets in at Cape St. Vincent later in the day than at the mouth of the Straits,—at Cape Finisterre later than at Cape St. Vincent,—at King's Island later than at Cape Finisterre, — at the Island Heek later than at King's Island,—at the entrance of the English channel later than at Heek,—at the shore of Normandy later than at the entrance of the channel. Thus far in regular order: but at Graveling, as if by an entire inversion of the order, and that with a great leap as it were, at the same hour, with a velocity like that which it has at the mouth of the Straits of Gibraltar. This second observation we apply to, and compare with, the first. For we think, as has already been said, that in the Indian and northern oceans the true currents of the waters, that is from the east to the west, are open and unimpeded, but in the channels of the Atlantic and southern oceans imprisoned and crossing, and reverberated by the interposition of lands, which extend both ways longitudinally from south to north; and no where but toward their extremities afford a free canal to the waters. But that strong direction of the waters, which is caused by the Indian ocean towards the north, and in the opposite direction from the north sea towards the south, differ infinitely in the extent of sea, affected on account of the diffe-

rent force and quantity of waters. But that this should take place is unavoidable. For the two great islands of the old and new world have the same figures, and are so stretched out as to broaden to the north, and taper to the south. The seas, therefore, on the contrary towards the south occupy a vast space, but to the north a small one, at the back of Asia, Africa, and America; consequently that great mass of waters which is discharged from the Indian ocean, and is refracted into the Atlantic, is capable of forcing or propelling the course of the waters in a continued movement nearly to the British sea, which is a part of the line described northwards. But that much smaller portion of the waters which issues from the north sea, and which has also a free passage westwards at the back of America, is not strong enough to turn the course of the waters southwards, except towards that point which we mentioned, namely, about the British sea. Now, in these opposite currents, there must be some goal where they meet and contend, and where within short space the order of advance is suddenly changed, as we have said occurs about Graveling—the focus of the currents from the Indian and northern oceans, and that a certain ocean stream is formed by opposite currents on the coast of Holland has been noted by numbers, not only from the inversion of the hour of the tide, which we have stated, but also from the peculiar visible effect. Now if this is so, we return to the position, that it must needs be that in proportion, as the parts and shores of the Atlantic extend southwards and approach the Indian sea, in the same proportion the tide is prior, and early in the order of approach, and in proportion as you go northwards (as far as their common goal), where they are forced back by the antagonist stream of the northern ocean, they are backward and late. Now that this is the case, the observation of the progression from the Straits of Gibraltar to the British sea manifestly proves. Wherefore we think that the tide about the shores of Africa is at an earlier hour than that of the Straits of Gibraltar, and in reversed order the tide about Norway earlier than the tide about Sweden—but this we have not ascertained by experiment or testimony.

A third experiment is the following: The seas confined by land on one side, which we call bays, if they stretch out with any inclination from east to west, which is in the same line of impetus with the true motion of the waters, have heavy and powerful tides; but if in the opposite direction, weak and scarcely perceptible. For the Red

Sea hath a considerable tide; and the Persian Gulf, with a yet more entire westward direction, a still stronger. But the Mediterranean, the greatest of all gulfs, and its parts the Tuscan, Pontic, and Propontic Seas, and in like manner the Baltic, all which tend eastward, are almost destitute of tide, or have only languid ones. But this difference is most conspicuous in certain parts of the Mediterranean which so long as they tend eastwards or turn towards the north, as in the Tuscan Sea and the others we have mentioned, are pacific and without much tide. But after getting a westerly direction, which takes place in the Adriatic, it acquires a remarkably large tide. To which we may also add this, that in the Mediterranean the slight reflux which is found begins from the ocean, the flow from the opposite direction, so that the water follows rather a course from the east than the natural refluence of the ocean. The three instances only we shall use for the present, in reference to this second inquiry.

There may be added to these another species of proof agreeing with those already advanced, but of a more difficult nature: it is this, that an argument may be sought for proof of this motion from east to west, not only from the consenting motion of the heavens of which we have already spoken,—where this motion is, as it were, in full flower and strength,—but also from the earth when it seems wholly to cease: so that it is really a direction of the universe, and pervades all things from the zenith to the interior parts of the earth. Now we apprehend that this conversion takes place from east to west (as in reality it is found to do), upon the south and north poles. And Gilbertus has, with great care and accuracy, accomplished for us this discovery, that the whole earth and nature, so far as we call it terrestrial, have an inclination or polarity, not softened down, but rigid and, as Gilbertus himself calls it, robust, latent, but betraying itself in many nice experiments towards the north and south. And this observation we thus modify and correct, that this ought to be asserted only of the exterior formation about the surface of the earth, and ought not to be extended to the bowels of the earth, for that the earth is a magnet was at one time conceived,—a light imagination,—for it cannot be that the inward parts of the earth resemble any substance which the eye of man hath seen; since all the substances among which we live are loosened, subdued, or broken up by the sun and heavenly bodies, so that they cannot possibly agree with those which have had their seat

in a place where the influence of the heavenly bodies does not penetrate;—but, which is our present subject, the more superficial crusts or formations of the earth appear to agree with the conversions of the sun, air, and waters, as far as solid and fixed bodies can agree with liquid and fluid, that is, not that they move towards the poles, but are pointed and turned towards the poles. For since every revolving sphere, which has fixed poles, participates of the nature of moveable and fixed; after, by its consistency or self-determining nature, the rotatory force is bound up, still the force and tendency to direct itself remains, is augmented and gathered into one; so that direction and verticity to the poles in hard bodies is the same with the revolution on their poles in fluids.

The third inquiry remains. Whence and how arises that reciprocal action of the tides, once in six hours, which coincides with a quarter of the diurnal motion, with that difference to which we have adverted. To understand this, let us suppose that the whole globe was covered with water, as in the general deluge; we conceive the waters as forming a complete and unbroken globe, would always roll in a progression from east to west each day to a certain extent: not certainly a great space, on account of the remission and debilitation of that motion as it approaches the earth; seeing the waters were no where obstructed or confined. Let us suppose again, that the whole land was an island, and that it extended longitudinally between south and north, which conformation and position most restrain and obstruct the motion from east to west; we think that the waters would keep on in their direct and natural course for a certain time, but, reverberated by the shores of that island, would roll back in equal intervals, that there would be, therefore, only one influx of the sea a day, and in like manner only one reflux, and that to each of these about twelve hours would be apportioned. And let us now suppose what is true and matter of fact, that the land is divided into two islands, those, namely, of the new and old world; for Australia, by its position, does not much alter the effect, as neither does Greenland nor Nova Zembla, and that these two islands extend through nearly three zones of the world, between which two oceans, the Atlantic and Southern, flow, and these nowhere find a thoroughfare, except towards the Poles; we think it necessarily follows, that these two ramparts impart and communicate the character of double reaction to the entire mass of waters. Whence arises that

motion in the quarter of a day,—so that the waters being cooped in on both sides, the ebb and flow of the sea would become visible twice a day, since there is a double advance and also a double recoil. Now if these two islands were extended through the waters like cylinders or columns, of equal dimensions, and with rectilinear shores, that motion might be easily perceptible, and might be pointed out to any one, which now seems to be perplexed and obscured by so great a variety of position of land and sea. For it is not difficult to form some conjecture what degree of velocity it is proper to ascribe to that motion of the waters, and what distances it may describe in one day. For if there be selected, in order to form a judgment of this matter, some of those coasts which are less mountainous or low lying, and which are contiguous to the open sea, and then the measure of the space of the globe interjacent between the extreme points of the flux and reflux, and that space be quadrupled on account of the four movements of the tide each day, and that number again doubled on account of the tides at the opposite shores of the same ocean; and to this number there be something added over and above on account of the height of the shores which always rise to a certain elevation above the channel of the sea; that calculation will give the space which this sphere of water, were it free from obstruction, and moving in progression round the enveloped globe of earth, would describe in one day, which certainly would not be great.

Now, with respect to that difference which coincides with the measure of the moon's motion, and forms the period of a lunar month; we think that the explanation is this, that the period of six hours is not the exact measure of this reaction, just as the diurnal motion of any of the planets is not accomplished in twenty-four hours precisely, and least of all that of the moon. Wherefore the measure of the ebb and flow of the tide is not a quarter of the motion of the fixed stars, which is twenty-four hours, but a quarter of the diurnal motion of the moon.

DIRECTIONS.

Let it be inquired, whether the hour of the tide on the coast of Africa be before the hour of tide about the Straits of Gibraltar. Let it be inquired whether the hour of the tide about Norway is before the hour of the tide about Sweden, and that, in like manner, before the hour of the tide at Graveling?

Let it be inquired, whether the hour of the tide on the coast of Brazil be before the hour of the tide on the coast of New Spain and Florida?

Let it be inquired, whether the hour of the tide at the shores of China is not found nearly the same with the hour of tide on the coast of Peru, and with the hour of reflux on the coast of Africa and Florida?

Let it be inquired, how far the hour of tide on the coast of Peru differs from the hour of tide at the coast of New Spain; and particularly what are the differences of the hour of tide at either shore of the Isthmus of Darien, in America; again, how far the hour of tide on the coast of Peru corresponds with the hour of tide on the coast of China?

Let it be inquired respecting the largeness of the tides on different coasts, not merely respecting their periods or hours. For although the largeness of tides is generally caused by the depressions of the shores, yet notwithstanding they are closely connected with the true principle of the motion of the sea, according as it is favourable or adverse.

Let inquiry be made with respect to the Caspian sea, which is formed by considerable bodies of water locked up without any outlet, into the ocean, if they are subject to ebb and flow, and what? our conjecture being that the waters of the Caspian Sea may have one tide a day, not two, and such that the eastern shores of it are deserted by the sea, while the western are overflowed.

And let inquiry be made, whether the increase of the tide at new and full moons and at the equinoxes, takes place at the same time in different parts of the world (and when we say at the same time, we do not mean at the same hour, for the hours vary, according to the rapidity of the waters' motion towards the shores as we have said), but in the same day.

Limits. The inquiry is not extended to a full explanation of the harmony of the monthly motion of the sea with the moon's motion, whether that takes place from a subordinate or a joint cause.

Relations. The present inquiry is connected with the inquiry whether the earth revolves with the diurnal motion of the heavens. For if the tide is, so to speak, the last stage of the gradual diminution of the diurnal motion, it will follow that the globe of the earth is immoveable, or at least that its motion is slower by far than that of the waters.

W. G. G.

TRANSLATION OF THE ABECEDARIUM NATURÆ,

BY ARCHBISHOP TENNISON.

PUBLISHED IN THE BACONIANA, 1679.

THE SAME IN ENGLISH BY THE PUBLISHER.

A Fragment of a Book written by the Lord Verulam, and entituled, The Alphabet of Nature.

SEEING so many things are produced by the earth and waters; so many things pass through the air, and are received by it; so many things are changed and dissolved by fire; other inquisitions would be less perspicuous, unless the nature of those masses which so often occur, were well known and explained. To these we add inquisitions concerning celestial bodies, and meteors, seeing they are some of greater masses, and of the number of Catholic bodies.*

Greater Masses.

The sixty-seventh inquisition. The threefold Tau, or concerning the earth.

The sixty-eighth inquisition. The threefold Upsilon, or concerning the water.

The sixty-ninth inquisition. The threefold Phi, or concerning the air.

The seventieth inquisition. The threefold Chi, or concerning the fire.

The seventy-first inquisition. The threefold Psi, or concerning celestial bodies.

The seventy-second inquisition. The threefold Omega, or concerning meteors.

Conditions of Entities.

There yet remain, as subjects of our inquiry, in our alphabet, the conditions of beings, which seem, as it were, transcendentals, and such as touch very little of the body of nature. Yet by that manner of inquisition which we use, they will considerably illustrate the other objects.

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* See the distribution, in l. 2. c. 3. de Augm. Scient. p. 234, 135, 136. Ed. Lugd. Bat. l. 3, c. 4, p. 231. And c. 4. Globi Intellect. p. 88, 89.

First; therefore seeing (as Democritus excellently observed) the nature of things is in the plenty of matter, and variety of individuals large, and (as he affirmeth) infinite; but in its coitions and species so finite, that it may seem narrow and poor; seeing so few species are found, either in actual being or impossibility, that they scarce make up a muster of a thousand; and seeing negatives subjoined to affirmatives, conduce much to the information of the understanding: it is fit that an inquisition be made concerning being, and not being. That is the seventy-third in order, and reckoned the fourfold Alpha.

Conditions of beings. The fourfold Alpha; or, concerning being, and not being.

Now possible and impossible, are nothing else but conditions potential to being, or not potential to being. Of this the seventy-fourth inquisition consists, and is accounted the fourfold Beta.

Conditions of beings. The fourfold Beta; or concerning possible and impossible.

Also, much, little; rare, ordinary; are conditions potential to being in quantity. Of them let the seventy-fifth inquisition consist, and be accounted the fourfold Gamma.

Conditions of beings. The fourfold Gamma; or, concerning much and little.

Durable and transitory, eternal and momentary, are potential to being in duration. Of these let the seventy-sixth inquisition consist, and be called the fourfold Delta.

Conditions of beings. The fourfold Delta; or, concerning durable and transitory.

Natural and monstrous, are potential to being, either by the course of nature, or by its deviations from it. Of these let the seventy-seventh inquisition consist, which is accounted the fourfold Epsilon.

Conditions of beings. The fourfold Epsilon; or, concerning what is natural or monstrous.

Natural and artificial, are potential to being, either with or without the operation of man. Of these let the seventy-eighth inquisition consist, and be accounted the fourfold Zeta.

Conditions of beings. The fourfold Zeta; or, of that which is natural and artificial.

We have not subjoined examples in the explication of the order of this our alphabet: for the inquisitions themselves contain the whole array of examples.

It is by no means intended, that the titles, according to

which the order of this alphabet is disposed, should have so much authority given to them, as to be taken for true and fixed partitions of things. That were to profess we already knew the things after which we inquire; for no man does truly dispose of things into their several classes, who does not beforehand very well understand the nature of them. It is sufficient, if these titles be conveniently adapted to the order of inquiry; the thing which is at present designed.

The Rule, or Form of the Alphabet.

After this manner we compose and dispose our alphabet.

We begin solely with history and experiments. These if they exhibit an enumeration and series of particular things, are disposed into tables; otherwise they are taken separately, and by themselves.

But seeing we are often at a loss for history and experiments, especially such as are luciferous, or instructive, and, as we call them, instances of the cross;* by which the understanding might be helped in the knowledge of the true causes of things: we propose the task of making new experiments. These may serve as an history in design. For what else is to be done by us who are but breaking the ice?

For the mode of any more abstruse experiment, we explain it, lest any mistake arise about it; and to the intent also that we may excite others to excogitate better methods.

Also we interspect certain admonitions and cautions concerning such fallacies of things, and errors in invention, as we meet with in our way.

We subjoin our observations upon history and experiments, that the interpretation of nature may be the more in readiness and at hand.

Likewise we lay down canons (but not such as are fixed and determined) and axioms which are, as it were, in embryo: Such as offer themselves to us in the quality of inquirers, and not of judges. Such canons and axioms are profitable, though they appear not yet manifest, and upon all accounts true.

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* See Nov. Organ. l. 2. Aph. 36.

Lastly; we meditate sometimes certain Essays of interpretation, though such as are low and of small advance, and by no means to be honoured (in our opinion) with the very name of interpretation.

For what need have we of arrogance or imposture, seeing we have so often professed, that we have not such a supply of history and experiments as is needful; and that without these, the interpretation of nature cannot be brought to perfection. Wherefore it is enough for us, if we are not wanting to the beginning of things.

Now for the sake of perspicuity and order, we prepare our way by avenues, which are a kind of prefaces to our inquisitions. Likewise we interpose bonds of connexion, that our inquisitions may not seem abrupt and disjointed.

Also we suggest for use some hints of practice. Furthermore, we propose wishes of such things as are hitherto only desired and not had, together with those things which border on them, for the exciting the industry of man's mind.

Neither are we ignorant, that those inquisitions are sometimes mutually entangled; so that some things of which we inquire, even the same things belong to several titles. But we will observe such measure, that (as far as may be) we may shun both the nauseousness of repetition, and the trouble of rejection, submitting notwithstanding to either of these, when in an argument so obscure, there is necessity of so doing, in order to the more intelligible teaching of it.

This is the form and rule of our alphabet.

May God, the creator, preserver, and renewer of the universe, protect and govern this work, both in its ascent to his glory, and in its descent to the good of mankind, for the sake of his mercy and good will to men, through his only Son, Immanuel, God with us.

TRANSLATION OF CATALOGUE OF BODIES,

ATTRACTIVE AND NOT ATTRACTIVE.

BY ARCHBISHOP TENNISON.

PUBLISHED IN THE BACONIANA, 1678.

If there be made a turn-pin of any metal, after the fashion of a magnetic needle, and amber be applied to one end of it, after having been gently rubbed, the pin will turn.

Amber heated by the fire, be it warmish, hot, or set on fire, it does not draw.

A little bar of iron red hot, flame, a lighted candle, a hot coal, put nigh sheaves (or straws) or turn-pins (or compass needles) do not draw.

Amber, in a greater mass, if it be polite, draws, though not rubbed: in a lesser quantity, and in a less polite mass, it draws not without rubbing.

Crystal, lapis specularis, glass, and other such electric bodies, if burnt, or scorched, draw not.

Pitch, the softer rosin, benjoin, asphaltum, camphire, galbanum, ammoniac, storax, assa, these draw not at all when the air is hot: but when it is cooler, they draw weakly, and so that we can just perceive them to do so.

Reeking air, blown up amber, &c. from the mouth, or from a moister atmosphere; choaketh the attractive virtue.

If a paper, or a piece of linen, be put between amber and chaff, there is no motion, or attraction made.

Amber, or other electrics, warmed by the sun-beams, have not their attractive virtue so awakened, as by rubbing.

Amber rubbed, and exposed to the beams of the sun, retains its attractive force the longer; and does not so soon lose it, as it would do in the shadow.

Heat derived from a burning-glass to amber, &c. does not help its attraction.

Sulphur, and hard wax, set on fire, do not draw.

Amber, when immediately after rubbing, it is applied to a shiver, or a compass needle, draws best of all.

The electric virtue is as vigorous, for a time, in its retention, as it was in its first attraction.

Flame (amber being put within the sphere of its activity) is not drawn by it.

A drop of water, amber being applied towards it, is drawn into a cone.

If electric bodies be rubbed too hard, their attraction is thereby hindered.

Those bodies, which in a clear sky do scarce draw, in a thick air move not at all.

Water put upon amber choaketh its attractive force, though it draweth the water itself.

Fat* so encompassing amber, that it toucheth it, takes away its attraction; but being so put betwixt it and the object to be drawn, as not to touch it, it doth not take it away.

Oil put upon amber, hinders not its motion: neither doth amber, rubbed with the finger moistened with oil, lose its attractive virtue.

Amber, jeats, and the like, do more strongly excite, and longer retain the objects they draw, although the rubbing be but little. But diamonds, chrystal, glass, ought to be rubbed longer, that they may appear hot, ere they be used for attraction.

Flames nigh to amber, though the distance be very small, are not drawn by it.

Amber, &c. draw the smoke of a lamp newly extinguished.

Amber draws smoke more strongly when it comes forth, and is more gross; and more weakly, when it ascends and becomes thinner.

A body drawn by electric bodies, is not manifestly altered, but only leans itself upon them.

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* For by Sarca, I suppose, he meaneth Sarcia.

TRANSLATION OF ORNAMENTA RATIONALIA.

A supply (by the publisher) of certain weighty and elegant sentences, some made, others collected, by the Lord Bacon; and by him put under the abovesaid title; and at present not to be found.

A Collection of Sentences out of the Mimi of Publius; Englished by the Publisher.

1. Aleator, quantò in arte est melior, tantò est nequior.
A gamester, the greater master he is in his art, the worse man he is.
2. Arcum, intensio frangit; animum, remissio.
Much bending breaks the bow; much unbending, the mind.
3. Bis vincit, qui se vincit in victoria.
He conquers twice, who upon victory overcomes himself.
4. Cùm vitia prosint, peccat, qui recte facit.
If vices were upon the whole matter profitable, the virtuous man would be the sinner.
5. Benè dormit, qui non sentit, quòd malè dormiat.
He sleeps well, who feels not that he sleeps ill.
6. Deliberare utilia, mora est tutissima.
To deliberate about useful things, is the safest delay.
7. Dolor decrescit, ubi quò crescat non habet.
The flood of grief decreaseth, when it can swell no higher.
8. Etiam innocentes cogit mentiri dolor.
Pain makes even the innocent man a liar.
9. Etiam celeritas in desiderio, mora est.
Even in desire, swiftness itself is delay.
10. Etiam capillus unus habet umbram suam.
The smallest hair casts a shadow.
11. Fidem qui perdit, quò se servat in reliquum?
He that has lost his faith, what has he left to live on?
12. Formosa facies muta commendatio est.
A beautiful face is a silent commendation.
13. Fortuna nimium quem fovet, stultum facit.
Fortune makes him a fool, whom she makes her darling.
14. Fortuna obesse nulli contenta est semel.
Fortune is not content to do a man but one ill turn.

15. Facit gratum fortuna, quam nemo videt.
The fortune which nobody sees, makes a man happy and unenvied.
16. Heu! quàm miserum est ab illo lædi, de quo non possis queri.
O! what a miserable thing it is to be hurt by such a one of whom it is in vain to complain.
17. Homo toties moritur quoties amittit suos.
A man dies as often as he loses his friends.
18. Hæredis fletus, sub personâ risus est.
The tears of an heir are laughter under a vizard.
19. Jucundum nihil est, nisi quod reficit varietas.
Nothing is pleasant, to which variety does not give a relish.
20. Invidiam ferre, aut fortis, aut fœlix potest.
He may bear envy, who is either courageous or happy.
21. In malis sperare bonum, nisi innocens, nemo potest.
None but a virtuous man can hope well in ill circumstances.
22. In vindicando, criminosa est celeritas.
In taking revenge, the very haste we make is criminal.
23. In calamitoso risus etiam injuria est.
When men are in calamity, if we do but laugh we offend.
24. Improbè Neptunum accusat, qui iterum Naufragium facit.
He accuseth Neptune unjustly, who makes shipwreck a second time.
25. Multis minatur, qui uni facit injuriam.
He that injures one, threatens a hundred.
26. Mora omnis ingrata est, sed facit sapientiam.
All delay is ungrateful, but we are not wise without it.
27. Mori est fœlicis antequam mortem invocet.
Happy he who dies ere he calls for death to take him away.
28. Malus ubi bonum se simulat, tunc est pessimus.
An ill man is always ill; but he is then worst of all when he pretends to be a saint.
29. Magno cum periculo custoditur, quod multis placet.
Lock and key will scarce keep that secure, which pleases every body.
30. Malè vivunt qui se semper victuros putant.
They think ill who think of living always.
31. Malè secum agit æger, medicum qui hæredem facit.
That sick man does ill for himself, who makes his physician his heir.

32. Multis timere debet, quem multi timent.
He of whom many are afraid, ought himself to fear many.
33. Nulla tam bona est fortuna, de quâ nil possis queri.
There is no fortune so good but it bates an ace.
34. Pars beneficii est, quod petitur, si bene neges.
It is part of the gift, if you deny genteelly what is asked of you.
35. Timidus vocat se cautum, parcum sordidus.
The coward calls himself a wary man, and the miser says he is frugal.
36. O vita! misero longa, felici brevis.

INQUISITION OF THE CONVERSIONS OF BODIES.

TRANSLATED BY A. BLAIR, ESQ. 1830.

Inquisition of the Conversions, Transmutations, Multiplications, and Productions of Bodies.

EARTH, by fire, is converted into bricks, which are of the nature of stones, and which we use for building, like stones. So with tiles.

Naphtha, which was that bituminous cement, wherewith the walls of Babylon were built, by time acquires exceedingly great hardness and firmness, equal to stone.

In clayey lands, where are pebbles and gravel, you shall find huge stones, concreted of pebbles and gravel, with stony matter interposed, as hard, or truly harder, than the pebbles themselves.

There are certain springs of water, wherein if you immerse wood, it shall be turned into the nature of stone; so as that the part sunk in the water shall become stone, the part above the water shall remain wood.

The viscous matter about the kidneys and bladder, in the human body, is converted into a pebble or stony matter. A stone, also, is often found in the gall-bladder; and sometimes, but this is most rare, in the vena porta.

Quære, how much time is required, that the matter of earth, in stone-quarries, may be converted into the stony nature?

Water, as there is reason to think, is changed into crystal; which may be seen in many caverns, where the crystal hangs in drops.

You may have an experiment of wood, or the stalks of plants, buried in quicksilver, whether they will harden, and, as it were, petrify, or no.

Report has much prevailed of a stone, bred in the head of an old and great toad.

It is related, that a certain nobleman, digging in the bed of his pool, found an egg turned into stone, the white and yolk retaining their proper colour; but the shell brightly sparkling, like a diamond exquisitely cut in faces.

Make experiment of some bodies, let down near to the bottom of a well, as wood, or other softer substances; but let them not touch the water, lest they rot.

They say that the white of an egg, through long insolation, or exposure in the sunbeams, has contracted the hardness of a stone.

Mud, in water, is converted in the shells of fishes, as in muscles,—(the fish) which are found in pools of fresh-water, that flow not, and are covered with moss. But the substance of those shells is exceedingly delicate, clear, and glistening.

TRANSLATION OF THE LATIN LETTERS,

CONTAINED IN VOL. XI. FROM PAGE 480, TO PAGE 491, ARE AS FOLLOW:—

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To the Count Gondomar, Ambassador from the Court of Spain.

Most illustrious Lord Ambassador,

Your lordship's love to me, both in its warmth and purity hath, I am well assured, been ever equal and unalterable in prosperity as in adversity; in which regard I offer you the thanks so worthily and justly claimed. Now that at once my age, my fortunes, and my genius, to which I have hitherto done but scanty justice, call me from the stage of active life, I shall devote myself to letters, instruct the actors on it and serve posterity. In such a course I shall, perhaps, find honour. And I shall thus pass my life as within the verge of a better.

God preserve your Lordship in safety and prosperity,

Your Servant,

Fr. St. Alban.

June 6th, 1621.

To Count Gondomar.

Most Illustrious and Excellent Lord,

I see and acknowledge the divine providence in raising up for me under my utter desertion, such a friend sent as it were from heaven, who involved in such great concerns,

and with time so very limited, has yet taken an interest in my fortunes, and has effected that for me, which other friends either dared not attempt or could not have obtained.

Your lordship will enjoy the suitable and lasting fruit of such dealing in your own noble character, so prone to all the offices of sympathy and honour. Nor will this perhaps be the least among your good deeds, that by your assistance and favour you have raised and strengthened me once one among the living, and who shall not altogether die to posterity. What return can I make? I shall at least ever be yours, if not in useful service, at least in heart and good wishes. The fire of my love for you will remain quick under the ashes of my fortune; wherefore, I most humbly greet you, bid you farewell, wish you all prosperity, call heaven to witness my gratitude, promise all faithful observance.

To the Most Illustrious and Excellent Lord Didacus Sarmiento de Acuna Count Gondomar, Ambassador Extraordinary of the King of Spain to England.

To Count Gondomar, then in Spain.

Most Illustrious Count,

Many things inspire me with confidence, and even with cheerful alacrity, in addressing you at this time on the subject of my fortunes, and entreating your friendly offices. First, and principally that since so close an alliance between our sovereigns may now be regarded as definitively arranged, you are become so much the more powerful advocate; and I shrink not now from owing all my fortunes to so great a man, though not my own countryman, and from professing the obligation. Secondly, Since that promise of indulgencies which your lordship while in this country obtained for me, has not been succeeded by repulses, nor on the other hand been completely fulfilled, it would seem from this as if the divine providence intended that the work of rescuing me from my misery was to be yours in its end, as in its beginning. Thirdly, because those two stars which have ever been propitious to me, the greater and the less are now shining in your city, and thus by the assisting and benignant rays of your friendship, they may acquire an influence on my fortunes, which shall restore

me to a place in the scale of favour, not unbefitting my former elevation. Fourthly, because I learn from the letters you have lately written to my intimate friend, Sir Toby Matthew, that you cherish a lively and warm remembrance of me, which has neither been overwhelmed nor extinguished, under the weight of those high and sublime interests which rest on your lordship. Lastly, too, there is this circumstance that since by the friendship of the excellent lord Marquis, I have been admitted to see and converse with my king, I feel as if I were once more established in favour. The king did not speak to me as a guilty man, but as a man thrown down by a tempest; and withal in his address to me he acknowledged at great length, and, as it seemed, with singular tenderness, my steady and invariable course of industry and integrity. Whence the greater hope springs up within me, that by the continuance of my sovereign's regard, and the extinction of odium by the lapse of time, your Excellency's efforts for me will not be made in vain. Meanwhile I have neither sunk into indolence, nor impertinently mixed myself with affairs, but I live and am absorbed in labours not at all derogatory to the honours I have borne, and which shall perhaps leave no unpleasing memory of my name to posterity. I hope therefore that I am no unworthy object, on which to display and signalize at once the influence of your power and friendship; so that it shall be apparent, that you have no less control over the fortunes of a private man, than over public measures. May God preserve your Excellency, and crown you with all happiness.

Indorsed—*My Lord St. Alban's first Letter to Gondomar into Spain.*

March 28th, 1623.

OF THE INTERPRETATION OF NATURE.

ACCOUNTING myself born for the use of mankind, and judging the case of the common weal to be one of those things which are of public right, and like water or air lie open to all; I sought what might be of most advantage to men, and deliberated what I was most fitted for by nature. I discovered that nothing is of such estimation towards the human race, as the invention and earnest of new things and arts, by which man's life is adorned. For I perceive that, even in old times among rude men, the inventors and teachers of things rude were consecrated and chosen into the number of the gods, and I noted that the deeds of heroes who built cities, or were legislators, or exercised just authority, or subdued unjust dominations, were circumscribed by the narrownesses of places and times. But the invention of things, though it be a matter of less pomp, I esteemed more adapted for universality and eternity. Yet above all, if any bring forth no particular invention, though of much utility, but kindleth a light in nature, which from the very beginning illuminates the regions of things, which lie contiguous to things already invented, afterwards being elevated, lays open and brings to view all the abstrusest things, he seems to me a propagator of the empire of man over the universe, a defender of liberty, a conqueror of necessities. But I found myself constructed more for the contemplations of truth than for aught else, as having a mind sufficiently mobile for recognizing (what is most of all) the similitude of things, and sufficiently fixed and intent for observing the subtleties of differences, and possessing love of investigation, patience in doubting, pleasure in meditating, delay in asserting, facility in returning to wisdom, and neither affecting novelty, nor admiring antiquity, and hating all imposture. Wherefore I judged my nature to have a kind of familiarity and relationship with truth. Yet seeing by rank and education I was trained to civil affairs, and, like a youth, sometimes staggered in my opinions, and conceived I owed my country something peculiar and not equally pertaining to all other parts, and hoped, if I obtained any honourable degree in

the commonwealth, to perform with greater help of ingenuity and industry what I had intended, I both learnt civil arts, and with all ingenuousness and due modesty commended myself to my friends who had some power. And in addition to this, because those things of whatever kind penetrate not beyond the condition and culture of this life, the hope occurred that I, born in no very prosperous state of religion, might, if called to civil offices, contribute somewhat to the safety of souls. But when my zeal was imputed to ambition, and my age was matured, and my disordered health also admonished me of my unhappy slowness, and I next considered that I nowise fulfilled my duty, while I was neglecting that by which I could through myself benefit men, and applying myself to the things which depended upon the will of another, I altogether weaned myself from those thoughts, and wholly betook myself to this work according to my former principle. Nor is my resolution diminished, by foreseeing the state of these times, a sort of declination and ruin of the learning which is now in use; for although I dread not the incursions of barbarians (unless perhaps the empire of Spain should strengthen itself, and oppress and debilitate others by arms, itself by the burden), yet from civil wars (which on account of certain manners, not long ago introduced, seem to me about to visit many countries), and the malignity of sects, and from these compendiary artifices and cautions which here crept into the place of learning, no less a tempest seems to impend over letters and science. Nor can the shop of the typographer suffice for these evils. And that unwarlike learning, which is nourished by ease, and flourishes by praise and reward, which sustains not the vehemency of opinion, and is the sport of artifices and impostures, is overcome by the impediments which I have mentioned. Far different is the nature of the knowledge, whose dignity is fortified by utility and operation. And from the injuries of time I am almost secure; but for the injuries of men I am not concerned. For should any say that I savour things too high, I reply simply, in civil affairs there is place for modesty, in contemplations for truth. But if any one require works immediately, I say, without any imposture, that I, a man not old, frail in health, involved in civil studies, coming to the obscurest of all subjects without guide or light, have done enough, if I have constructed the machine itself and the fabric, though I may not have employed or moved it.

And with the same candour, I profess that the legitimate interpretation of nature, in the first ascent before arriving at a certain degree of generals, should be kept pure and separate from all application to works. Moreover, I know that all those who have in some measure committed themselves to the waters of experience, seeing they were infirm of purpose, or desirous of ostentation, have at the entrance unreasonably sought pledges of works, and have thence been confounded and shipwrecked. But if any requires at least particular promises, let him know that by that knowledge which is now in use, men are not skilled enough even for wishing. But, what is of less moment, should any of the politicians whose custom it is from personal calculations to estimate every thing, or from examples of like endeavours to form conjecture, presume to interpose his judgment in a matter of this sort, I would have told that ancient saying, "claudus in via, cursorem extra viam antevertit," and not to think about examples since the matter is without example. But the method of publishing these things is, to have such of them as tend to seize the correspondencies of dispositions, and purge the areas of minds given out to the vulgar and talked of; to have the rest handed down with selection and judgment. Nor am I ignorant that it is a common and trite artifice of impostors, to keep apart from the vulgar certain things which are nothing better than the impertinencies they set forth to the vulgar. But without any imposture from sound providence, I foresee that this formula of interpretation, and the inventions made by it, will be more vigorous and secure when contained within legitimate and chosen devices. Yet I undertake these things at the risk of others. For none of those things which depend upon externals concern me. Nor do I hunt after fame, or, like the heretics, take delight in establishing a sect; and, to receive any private emolument from so great an undertaking, I hold to be both ridiculous and base. Sufficient for me is the consciousness of desert, and the very accomplishment itself of things, which even fortune cannot withstand.

W. G. G.

THE MASCULINE BIRTH OF TIME;

OR, THE GREAT INSTAURATION OF MAN'S DOMINION OVER THE UNIVERSE.

To God the Father, God the Word, God the Holy Ghost, I address my most humble and ardent prayers, that mindful of the miseries of man, and of this pilgrimage of life, of which the days are few and evil, they would open up yet new sources of refreshment from the fountains of good, for the alleviation of our sorrows; and also, that things divine may not in this be prejudiced by things human, nor from the opening up of the passages of sense, and the kindling of greater natural light, any infidelity or darkness may arise in our minds towards the mysteries of God: but rather that, by the understanding cleansed and purified from fantastic and vain ideas, yet wholly submissive and subjected to the divine oracles, those things which are of faith may be rendered to faith. W. G. G.

TRANSLATION OF THE MASCULINE BIRTH OF TIME.

OR, THREE BOOKS CONCERNING THE INTERPRETATION OF NATURE.

1. The Purification and Application of the Mind.
2. The Light of Nature, or Method of Interpretation.
3. Nature illuminated, or the Truth of Things.

C. I. *Legitimate Mode of Statement.*

I find, my son, that men in showing forth, and no less in concealing the knowledge which they think they have acquired, have not acted in a spirit of good faith and of duty. No less mischievous, though perhaps less shameful, is the error of those, who, with good intentions but little wisdom, are ignorant of the art and rules proper for setting forth their several subjects. We do not intend, however, to begin a complaint of either this perversity or ignorance in the expounders of knowledge. Had they, by unskilful

teaching, broken down the weight of the subjects taught, it might, no doubt, have been matter of just indignation. But in teaching inaptitude, it was natural to expect absurdity. I, however, far different from such instructors, intend to impart to you not fictions of imagination or shadows of words, not a mixture of religion, not certain common-place observations, or certain well known experiments adjusted to conformity with fanciful theories, but to bind and place at your command nature with her offspring about her; and can this be supposed a theme fit to be debased by pretension or unskilfulness, or other defective treatment. So may I exist, my son, and so may I extend the now deplorably narrow limits of man's dominion over the universe to the permitted boundaries (which is the only object of my prayers among human things), as I shall disclose to you these things with the fullest conviction, with the deepest forecast of my mind, and after the profoundest research into the present state of knowledge, in the method of all others the most legitimate. "And what," you will say, "is this legitimate method? Have done with artifice and circumlocution; show me the naked truth of your design, that I may be able to form a judgment for myself." I would, my dearest son, that matters were in such a state with you as to render this possible. Do you suppose that when all the entrances and passages to the minds of all men are infested and obstructed with the darkest idols, and these deep seated and burnt in, as it were, into their substance, that clear and smooth spaces can be found for receiving the true and natural rays of objects? A new process must be instituted, by which to insinuate ourselves into minds so entirely obstructed. For as the delusions of the insane are removed by art and ingenuity, but aggravated by violence and opposition, so must we adapt ourselves here to the universal insanity. What? do even those less difficult requisites pertaining to the legitimate method of delivering knowledge, appear to you such light and easy matters? That it be ingenuous, that is, afford no handle or occasion for error; that it have a certain native and inseparable quality, both to conciliate belief, and repel the injuries of time, so that the knowledge so delivered, like a vigorous and healthy plant, may daily shoot and thrive; that it appear to place itself in, and adapt itself to the situation of its proper and reasonable reader. Whether I shall show in the sequel all these qualities or not, I appeal to futurity. W. G. G.

THE HISTORY AND FIRST INQUISITION OF SOUND AND HEARING,

AND TOUCHING THE FORM OF SOUND, AND THE SECRET PROCESS OF SOUND; OR THE WOOD OF SOUND AND HEARING.

Of the generation of sound, and the first percussion.

Of the lasting of sound, and of the perishing and extinction of sounds.

Of the confusion and perturbation of sounds.

Of the accessory aids and impediments of sounds.

Of the stay of sound, and the diversity of mediums.

Of the penetration of sounds.

Of the carriage of sounds, and their direction or spreading, and of the area which sound fills, together and severally.

Of the variety of the bodies, which yield sound; and the instruments; and of the species of sounds which occur.

Of the multiplication, majoration, diminution, and fraction of sounds.

Of the repercussion of sounds, and echo.

Of the consent and dissents of audibles and visibles, and of other, so called, spiritual species.

Of the quickness of the generation and extinction of sound, and the time in which they are effected.

Of the affinity or non-affinity which sound hath with the motion, local and perceptible, of the air in which it is carried.

Of the communication of the air percussed and elided, with the ambient air, and bodies, or their spirits.

Of the forming or articulation of sound.

Of the very impression of sounds upon the sense.

Of the organ of hearing, and its disposition and indisposition, helps, and hindrances.

The inquiry into sound and hearing I have thought well forthwith to set on foot; for it advantageth the under-

standing, and, as it were, makes matter of its health, that the contemplations of the spiritual species, as they call them, and of operations at distance, be mixed with the contemplation of those things, which work by communication only of the substance to the touch. Again, the observations concerning sounds have brought forth to us the art of music. But it is customary, and as it were invariable, when trials and observations have grown into art, that the mathematic and practic is pursued, the physic is left. Moreover, optic fareth some whit better; for not only the art of painting and beauty and symmetry are propounded unto optic, but the contemplation of all visibles; but unto music, only musical tones. Therefore we do inquire of sounds.

OF THE GENERATION OF SOUND, AND THE FIRST PERCUSSION.

The collision, or elision, as they speak, meaning thereby some section or cutting of the air, which they will have to be the cause of sound, imports neither the form, nor the secret process of sound, but is a term of ignorance and superficial contemplation.

Sound is diffused and moves with so small an impulse in its generation; also so far, and that in round, not much depending on the first direction; withal so smoothly, without any evident motion, found either by flame, or by feathers and straws, or in any other manner; that it seems altogether hard that the form of sound should be any cutting, or local and perceptible motion of the air, howsoever this may hold the part of the efficient.

For that sound is so suddenly generated, and straightway dies, it seems necessary that either its generation do a little thrust the air from its nature, and its perishing restore it, as in the compressions of waters, whereas a body cast into the water makes many circles in the waters, that come of the water at first compressed, afterward restoring itself into its proper consistence and dimension (which we have used to call the motion of liberty); or that, contrariwise, the generation of sound be an impression pleasant and kindly, that winneth upon the air, and whereunto the air freely stirreth itself, and that its extinction be from some enmity, which suffers not the air longer to enjoy that agitation and impression; as in the generation of the very body of flame, wherein the generation of the flame appears

to be made with alacrity, but by the air and other environing adversaries presently to be destroyed.

The whistling, which is made by the mouth without use of a whistle, may be effected by sucking in of the breath toward the inner parts of the mouth, not only by expelling of the breath outwards; and clearly all sucking of the air inwards gives a sound, which seems exceeding worthy of remark: because the sound is generated against the perceptible motion of the air, so as the first impulsion of the air appears plainly to be the remote efficient and no part of the form of sound.

In like manner, if there be an egg of glass taken, and the air through a small hole forcibly sucked out; then the hole stopped with wax, and it be laid by for a time; if afterwards the wax be removed from the hole, you shall hear plainly the hissing of the air entering into the egg, being drawn to wit by the inner air, after forcible rarefaction, restoring itself. So as in this trial also, sound is generated contrarily to the perceptible motion of the air.

In like manner, in the toy that is called a jew's-harp, holding the sides betwixt the teeth, the little tongue of iron is drawn outwards and jarred, when it flies back inwards against the air that is in the mouth, and thence is a sound created.

And in these three trials it may not be doubted but that sound is generated by the percussion of the air inwards towards the mouth on the egg of glass.

Sound is generated by percussions. The percussion is either of air against air, or of an hard body against the air, or of an hard body against an hard body.

The instance of the percussion of air against air chiefly prevails in the human voice, and in the voices of birds and of other animals; next in musical wind instruments; also in ordnance, greater and less, where the percussion that gives the sound is generated chiefly by the percussion of the confined air that issues from the mouth of the piece against the outer air; for the bullet wherewith it is charged makes not much to the noise. Neither is the percussion of a soft body against a soft body only seen in the percussion of air against air, but also of air against flame, as in the raising of a flame with bellows; also flames amongst themselves, when one drives another, yield a certain roaring; but whether the air assist here may be further inquired. Also, all flame that suddenly taketh, if it be of any greatness, makes a sound, rather as I think in displacing of the

air than of itself. Also in eruptions, there is percussion made of the spirit breaking out against the air adjacent; as in the cracklings made by dry leaves, or bay salt, and many other things, when cast into the fire; and in thunder, either by the spirit breaking out from the cloud, or wallowing and tossed to and fro, as in the more hollow and lengthened rolling of thunder; also we see in sport that a fresh rose leaf gathered together so as it shall contain air, and struck upon the back of the hand or upon the forehead, cracks by eruption of the air.

Instances of the percussion of an hard body against the air are seen in musical stringed instruments; in the whistling of an arrow, as it flies through the air; in the beating of the air, although it strike not any hard body; also, in regals their sound is given by the air striking against water, in the pipe they call the nightingale-pipe, which gives a sound continually tumbling; in water agitated and restoring itself again; and in the toys wherewith children please themselves (they call them cocks) in imitating of the voices of birds, likewise in other hydraulics.

Instances of the percussion of an hard body against an hard body are found either simply, or with communication of some air inclosed beside that air, which is cut or elided between the hard bodies percussed; simply, as in all hammering or knocking of hard bodies, with communication of air penned in, as in bells and drums.

A stone cast forcibly into the water gives a sound; as do the drops of rain falling upon the water, and no less wave dashing against wave, in which there is percussion betwixt an hard body and water.

It seemeth to be constant in the generation of all sound, that there are certain parts of air, and that air is required between the bodies percussed; which air, in the percussion of an hard body against the air, and of an hard body against an hard body, appears manifestly to be cut or elided. I judge that flame should suffice for this in the stead of air, as if in the midst of a great flame a bell should be rung, or stones knocked together; but in the percussion of air against air this elision or separation appears more dark, but the air seems only to be beaten and driven, and that in a soft voice, very gently. But it seems, even in this kind, to need that there be some elision of the air percussed by the air percussing: for even in air moved by a fan, the air from the side of the fan, and when air is blown out of bellows, the blast of air from the mouth,

divides the other air. But concerning this kind of elision of the air, which happens when the percussion of air against air createth sound, as in the voice, let inquiry be made further.

It is well doubted, whether the percussion that produces sound, when the air is percussed by a string, or otherwise, be from the beginning, when the string starting back percusses the air, or a little after, the air to wit being compressed by the first percussion, and thereafter acting the part, as it were, of an hard body.

When sound is yielded by the percussion of air against air, it is required that there be an imprisoning or penning of the air in some concave, as in whistling by the mouth, in pipes, in the viol, in the voice; which is divided, where the air is penned in the hollow of the mouth or throat. In the percussion of an hard body against air is required hardness of the body and quick motion, and sometimes communication with a concave, as in the cittern, lute, beating of the air, &c.; but in the percussion of an hard body against an hard body, the hollow, or the quick motion, is less required.

There is a talk of a white gunpowder, which should give percussion without noise. It is sure that nitre, which is white, is of great force for expulsion, yet in such wise as the speedy kindling doth much enhance both the percussion and the noise; but the quick kindling is caused specially by the coal of willows, which is black. Therefore if a composition were made of sulphur and nitre, and a modicum of camphor, it is like that the kindling would be slower, and the percussion not so jarring and sharp; whence much might be diminished of the sound, but with loss too in the strength of the percussion. To be further inquired.

OF THE LASTING OF SOUND, AND ITS PERISHING AND EXTINCTION.

The lasting of the sound of a bell that is struck, or of a string which seems to be prolonged, and gradually to fade, comes not rightly of the first percussion, but the trembling of the body percussed generates in the air continually new sound. For if that trembling be checked, and the bell or string stayed, the sound quickly dies; as in virginals, where if the quill be dropped so that it touch the string the sound ceases.

A bell hanging in the air gives a far louder and more enduring sound if it be chimed upon with an hammer on the outside, than if it stood fixed, and were in like manner chimed upon with an hammer. And of the more enduring sound the reason is rendered already, because it trembleth longer. But that even the first sound in the hanging bell is more resounding, in the standing less would be further inquired.

Likewise a drinking cup of silver or of glass that is fillipped, if it be left alone, gives a sound louder and more lasting; but if the foot of the cup be steadied with the other hand, a far duller, and of shorter stay.

The sound which is yielded in the viol or cittern is plainly not made by the percussion between the finger, or the quill, and the string, or between the finger, or the quill, and the air, but by the finger impelling, and thereafter the string flying back, and in that recoil percussing the air. Therefore when the string is moved with a bow, not by the finger, or a quill, the sound can be continued at pleasure, through the roughness of the string of the bow, which is a little smeared with rosin; whence it slides not on the string, nor once strikes it, but holds and continually tortureth it, out of which motion the sound is maintained.

It can be taken for an argument that sound is manifestly some kind of local motion in the air, that it so suddenly fails; because, in all cutting or impulsion of the air, the air quite recovers and restores itself, which also water doth through many circles, albeit not so speedily as the air.

OF THE CONFUSION AND PERTURBATION OF SOUNDS.

In the act of sight, visibles from one part impede not visibles from other parts; but all the visibles which offer themselves from every part, lands, waters, woods, the sun, buildings, men, are at once represented to the eyes. But if so many voices or sounds did at once issue from several parts, the hearing should be plainly confounded, nor might distinctly perceive them.

The greater sound confoundeth the less, that it should not be heard; but spiritual species, as they speak of a diverse kind from sound, confuse not sound, but altogether and at once hang in the air, the one little or nothing troubling the other; as light, or colour, heat and cold, smells, magnetic virtues; all these together can hang in the air, nor yet do greatly hinder or disturb sounds.

The cause wherefore many visibles are at once represented unto the eyes, the one not confounding the other, would seem to be none other but this: that visibles are not seen except in a right line, but sounds are heard even in a line oblique, or arcuate. Therefore as many objects, in the area of the sphere of sight, as are conveyed, there be so many cones of beams, nor ever one cone doth coincide with another; neither do the vertices of the cones meet in the same point, because they are carried by right lines. But sounds, which are carried by lines both right and arcuate, can meet easily in one point, and so are confused. The same seemeth to be the cause wherefore a more bright colour drowns not a more dim colour; nevertheless a greater light obscures and hides a weaker light, because light is perceived in an arched line, like as sound. For although the very flame of a candle be not seen except in a right line, yet does the light that is every where spread round attain to the sight in lines, arched in respect of the body of the candle: the like is the case of the sun, or flame. Now if it be objected that neither is light itself seen except in a right line from air illuminated, it is true; but I think that this as well happens to sound: for neither is sound heard unless in right lines from some part of the sphere of sound, whither the first pulsation arrives. But colour, which is nothing other than the image unequally reflected of the light, spreadeth around so weak species, that it little or nothing tinges the air adjacent, unless where the colours are conveyed in right lines between the object and the eye.

Let there be a trial made with a double recorder, in which let there be two fipples, at each end one, so as they may be played in unison: the hollow pipe being of a double length, and continued in one, let two together play the same tune at either end, and let it be noted whether the sound be confused, or amplified, or dulled.

Let there be two hollow trunks taken, and joined together crosswise, so as they shall open the one into the other, in the place where they are joined; and let two speak into the direct and transverse trunk, and let the ears of two be in like manner applied to the opposite ends, and observe whether the voices confuse one another.

OF THE ACCESSORY AIDS AND IMPEDIMENTS OF SOUND; OF THE STAY OF SOUND; AND THE DIVERSITY OF MEDIUMS.

I remember in a chamber in Cambridge that was something ruinous, that a pillar of iron was erected for a prop, of the thickness perhaps of a thumb's breadth and an half; and that this pillar, being struck with a stick or otherwise, made a little flat noise in the chamber wherein the pillar stood, but in the chamber beneath a resounding boom.

To inquire, which bodies, and of what solidity and thickness, altogether debar and shut out sound; as, also, which more or less dull, although they intercept it not wholly. For as yet is it not known which mediums interposed be more propitious, which more adverse. Therefore let there be trial made in gold, stone, glass, cloth, water, oil, and of the thickness of each. Hereof is all need to inquire further.

Air is the aptest, and, as it were, the sole medium of sound. Again, the moister air (I judge) better conveyeth sound than the drier; but in a fog what happeneth I remember not. Also the night air better than by day; but this can be ascribed to the silence.

Inquire touching the medium of flame, what its operation shall be in respect of sound; whether, to wit, a flame of some thickness altogether stop and intercept sound, or at least deaden it more than the air. This can be seen in bonfires.

Also to inquire concerning the medium of air vehemently agitated. For although wind carry sound, yet I deem that any vehement wind doth somewhat trouble sound, so as it shall be heard less far, even with the wind, than in still weather, of which let there be more inquiry made.

To see what sound brass or iron, red hot, yields, struck with a hammer, compared to that which it gives cold.

OF THE PENETRATION OF SOUNDS.

The aëtites, or eagle stone, hath like a kernel or yolk of the stone, which being shaken makes a flat sound; so an hawk's bell [stopped], but a much clearer if there be a chink.

Let inquiry be made of divers, if they hear at all under water, especially that is of any deepness; and let this be

distinctly inquired, not only whether they hear any sound at all from above, which is made in the air, but also, whether they hear the percussion of the body of the water within the water, where no air is. I have made this trial in a bath; a pail of a good size with the mouth turned over was, in such wise, pressed evenly down, as it carried the air fairly down with it, in its hollow, below the water, to the depth of an hand breadth; and in this manner the pail was held down with the hands, that it should not overturn nor rise: then a diver put his head within the pail, and did speak: his voice was heard, speaking; and even his speech was articulately distinguished, but wonderfully shrill, and almost like a whistling, as the voice useth to be heard in a play of puppets.

Let it be exactly inquired, so as it be clearly rendered positive whether sound can be generated, except there be air betwixt the percussing and the percussed body. As, if two pebbles hanging by a string be let down into a basin of water, or a river, and shaken, so as they shall strike together in the midst of the water; or let an open pair of tongs be thrust down into the water, and there knapped; and let it be noted whether they give a sound, and what. I do suppose that divers, in swimming, make no noise under the water; unless there may perchance be some, by the succession of motion unto the surface of the water, and the water thence striking the air.

There is no doubt but in bladders tied, and not quite full, and shaken, there is a sound given, namely, of the liquor contained in them, and no less a sound is given on letting down a stone into water, when it strikes the bottom of the vessel. But in the former trial air is intermingled; in the second, the percussion of the bottom of the vessel by the stone communicates with the air without the vessel. But after the first percussion it needeth not that there be air intermediate through the whole area of the sphere deferent; for that is shewn by the trial of one speaking in a pail under the water, where part of the deferent from the water is not air, but the wood of the pail, and the water; whence the sound is sharpened, and minished, and lost.

But because it is manifest that sound passes through and penetrates hard bodies (as potters' earth and glass); and it is also most certain (although hitherto concealed from men's observation) that there is, in every tangible body, some pneumatical part, besides the gross parts intermixed, it is to be considered whether penetration of sound

of this kind come not thence, for that the pneumatical or aerial parts of the tangible body communicate with the outer air.

Take a vessel of silver, and another of wood, full of water; take a pair of iron tongs, and knap them in the water in the vessels, at the distance of a thumb's breadth, perhaps, or more, from the bottom: you shall hear the sound of the tongs knapped in the vessel of silver much more resounding than in the wooden one. Whereas if the two vessels were empty, and you knapped the tongs at the same distance, there should be little difference or none. Whence it appears, first, that where is no air that can be elided, but only water, sound is given; next, that the sound given by the percussion communicates better with the vessel through water than through air. The mouth being close shut, there is made a murmur (such as dumb persons use to make) by the throat; if the nostrils likewise be fast closed, no murmur can be made. Whence it appears, that that sound by the throat is not effected, unless through the opening which lies between the throat and the nostrils.

OF THE CARRIAGE OF SOUNDS, AND THEIR DIRECTION OR SPREADING; AND OF THE AREA WHICH SOUND FILLS, TOGETHER AND SEVERALLY.

All sound is diffused in a sphere from the place of the percussion, and fills the whole area of this sphere to a certain limit, upwards, downwards, sideways, and every way.

Throughout this orb the sound is loudest close to the stroke; thence, in the proportion of the distance, it grows more faint, until it vanishes. The limits of this sphere are extended some little by reason of the quickness of hearing; yet is there something uttermost, whither, to the most delicate sense, sound reaches not.

There is something, I think, in the direction of the first impulsion; for, if a man should stand in an open pulpit in the fields, and shout, the voice, I judge, should be further heard forwards from the speaker than behind. So if ordnance, or an harquebuss be discharged, I judge that the sound shall be further heard before the ordnance or harquebuss than behind it.

Whether there be any thing in the ascension of sound upwards, or in the descension of sound downwards, which may further sound, or make it cease nearer, doth not

appear. The sound is indeed well heard, if one speak from a high window or turret, by those who stand upon the ground; and contrariwise, being uttered by those that stand upon the ground from the window or turret, but by whether more easily, or further off, let better inquiry be made.

Pulpits are used for speaking in assemblies, and generals did usually speak standing upon mounds of sods; yet is it in no wise hence confirmed that sound easilier descends than it rises, since the cause hereof may be the liberty of the air in the higher place, not thronged or hindered, as below amongst the crowd, but not the readier motion downwards. Therefore let not the contemplation stay in this instance, but let a trial be made where other things are equal.

The power of the sound is received whole in every part of the air, not the whole in the whole air, unless where the opening or passage is exceedingly straight. For if one stand in any place utterly closed, so as the sound may not penetrate at all, and that in any part soever of a sphere of sound, and there be a small opening made, the articulate voice shall enter through that opening, and in fine through as many openings as you shall chuse to make through the whole round of the sphere of sound; so as it is manifest that that whole articulation of sound is conveyed entire in these minutest parts of the air, not less than if the air were at large on every side.

It is, however, to be observed whether sound proceeding from the greater pulsations of the air (such as are made by the discharge of ordnance) become not more exile when they enter by those small apertures; for it may be that the subtilities of sound shall enter unconfused, but the whole crash, or roar, not so well.

The rays of visible bodies do not strike the sense, unless they be conveyed through the medium in straight lines, and the interposition of any opaque, in a right line, intercepts the sight, although every thing else be on all sides wholly open. But sound, if there be a dilation or passage, whether by arching over, or by inverted arching downwards, or laterally, or even by winding, perishes not, but arrives. Nevertheless, I judge that sound is more strongly carried in straight lines, betwixt the pulsations and the ear, and that by its archings and windings it is somewhat broken, as if there be a wall betwixt the speaker and the hearer, I think that the voice shall not be so well heard as if the

wall were away. I judge too, that if the speaker or the hearer be placed at a little distance from the wall, the voice shall be better heard than nigh unto the wall, because the arching so much the less departs from a right line. But this also would be further inquired.

If the ear be laid to the one end of any tube or long hollow trunk, and a voice speak softly at the other opening of the tube, such a voice shall be heard, which, being as softly spoken in the air at large, should not arrive, nor be heard. Whence it is clear, that that confining of the air helps to the conveying of the voice, without confusion.

It is also a common opinion, that, other things being equal, the voice is better heard within doors than abroad; but whether the voice be better heard when the ear is out of doors, and the voice within the house; or contrariwise, when the voice is out of doors, and the ear within the house, may be further inquired; albeit herein also the opinion is received, that what is abroad is better heard within doors, than what is within, abroad.

It is common to hearing and sight, and indeed, in a certain measure, to the other senses, that the attention of the perceiving mind, and express direction to perceiving, helps somewhat to perceiving, as when one looks steadfastly, or (as they say) pricks his ears.

Sounds are not carried so far, articulate and distinct, as their species, and a confused coil of them; for the hum of voices can be heard where the articulate words themselves are not heard; and a confused tinkling of music, when the harmony itself or tune is not heard.

Sound is preserved, at the best, in a hollow trunk. Therefore let there be taken a hollow trunk of a good length, and let it be put out from the window of a lower chamber; let one speak by thrusting of his head out of the window, at one end of the trunk, as softly as ever he may; let another lay his ear to the other end of the trunk, standing below upon the ground: let this be done in likewise reversely, by speaking from below, and laying to of the ear above, and from this trial let a judgment be made, whether the voice ascend or descend more easily, or even alike. They deliver for certain, that there be some places and buildings so vaulted, that if one stand in a certain part of the chamber, and speak, he can be better heard at some distance than near.

All harmony appeareth to sound somewhat fuller and deeper at a little remoteness from the place of the sound

than near: so as something should seem to happen to hearing about sound, like as happeneth to sight about visible species, that some removal from the organ of the sense furthereth the perception of the sense. But in that opinion may be twofold error. First, because in the act of sight there be, perhaps, beams required from the object to the pupil, which there cannot be where the object toucheth the pupil, which between the hearing and the sound is not required. But much rather, because to seeing is light needed. But an object touching the pupil intercepts the light; whereas nothing of this kind befalls to hearing. And in the second place, because to sight there needeth not always a medium: forasmuch as, in the removing of cataracts of the eyes, the little silver needle wherewith the cataracts are removed, even when it moveth upon the pupil within the coat of the eye, is excellently seen.

In objects of sight, if the eye be placed in the dark, and the object in the light, it shall do well; but if the object be placed in the dark, and the eye in the light, you shall not see. So if a thin veil or net work be cast over the eyes, the object is well seen; if upon the object, it confounds sight. And albeit, that perhaps neither of these agreeth to sound and hearing, yet may they advertise us that trials be made, whether the ear set against the hollow trunk, if the sound be made at a distance in the air at large, or conversely, the sound be produced at the hollow trunk, the ear being placed at a distance in the air at large, favour more the perception of the sense.

OF THE VARIETY OF THE BODIES WHICH YIELD SOUND; AND THE INSTRUMENTS; AND OF THE SPECIES OF SOUNDS WHICH OCCUR.

The kinds of sounds appear to receive such a division: loud, soft, sharp or treble, base; musical, unmusical; interior or whispering, exterior or sounding; simple, compounded, original, reflected; so as they are divisions six.

The stronger the first pulsation shall be, and the dilation the more free, and without let, the greater is the sound given: the weaker the percussion, and more disturbed the dilation, the less.

Treble sounds are carried as far, and perchance farther than, base. Let this be better inquired.

Accordingly as the concave of a bell shall be greater, it giveth a baser sound; the less, the more treble.

The bigger a string, the baser sound it shall yield; the less, the more treble.

A string, the more tightly strained, the more treble sound shall it yield; the looser, the baser: so as a little bigger string more tightly strained and a less more slackly shall give the same note.

In trumpets, in like wise, in flutes, horns, and recorders, pipes, also in the mouth of a man whistling, the more narrow and strait they are, they give the more treble sound; the wider, or more open, the baser.

In flutes, the air, issuing by an hole nearer the breath, yields a more treble sound; by one more distant, a baser: so a little bigger flute by the nearer hole, and a smaller by the more removed, may give the same note.

In some stringed instruments (as in the viol, citterns, and the like) men have found a skill for the straining of the strings, beyond the first straining, so as compressing them with the fingers lower down or higher up, they strain them to the alteration of the note.

If a drinking-cup of glass or silver be taken and fillipped, if the water stand higher in the cup, and the cup be fuller, it will give a more treble sound; if lower, and the cup be more empty, a baser.

In an hollow pipe, such as they use for shooting of birds, if one whistle with the mouth, setting the mouth to one end of the tube, the sound is dulled, truly, to the by-stander; but if the ear be laid to the other end, it gives a most sharp sound, so as it shall hardly be borne.

Let there be a trial made, with a trunk, in the part where the ear is laid, narrow, in the part where the mouth is set, wider, and conversely; whether the sound be rendered more treble or baser, after the manner of mirrors, which contract or enlarge the objects of sight.

OF THE MULTIPLICATION, MAJORATION, DIMINUTION, AND FRACTION OF SOUND.

It would be seen in what, how, way, manner, sound can be artificially magnified and multiplied. Mirrors do effect both in sight. Now the sudden reflexion of sound seems to turn to augmentation: for if the voice and echo be yielded together, need is that the sound be not distin-

guished, but magnified. Therefore sounds upon rivers are greater, the water resounding and blending itself with the original sound.

I have also noted that when a round-house is made in water-conduits, then a long vault, and then a greater chamber (such as is to be seen in the fields by Charing Cross near London), if you cry at the window or slit of the round-house, and one stand by the window of the greater chamber, a far more fearful roaring is heard than by one standing where the cry is made.

I bethink me that in the play of puppets, the speaking is such as it is heard distinctly, but far sharper and more exile than in the air at large; as happens in mirrors that render letters far smaller than they are in the ordinary medium: so as sound appears plainly possible by art to be both amplified and rendered more exile.

Children hold the horn of a bent bow betwixt their teeth, and with an arrow strike the string, whence is produced a more resounding sound, and a far greater boom, than if the bow were not held in the teeth; which they ascribe to the consent which the bones of the teeth have with the bone of hearing; since, conversely also, by a certain harsh sound in the hearing, the teeth too be set on edge.

In like manner, let a lance touch the wood of the belly of an harp, especially of the hole in it at the hollow end, and be held with the teeth at the other end, and the harp struck; the sound is made greater by taking hold with the teeth, that is to say, to him that so taketh hold.

It is most assured (however unnoted) that the force, which after the first percussion carries on balls, or arrows, or darts, and the like, is situated in the minute parts of the body discharged, and not in the air continually carrying it, like a boat in the water. This being premised, it may be considered whether sound might not be lessened in ordnance or an harquebuss, without much weakening of the percussion, in this manner. Let there be an harquebuss made with a barrel of a pretty strength, so as it break not easily; in the barrel let there be four or five holes made, not like chinks, but round, about the middle of the barrel. The percussion hath already gotten its force, excepting so far as by reason of the length of the barrel it may be increased; but the percussion of the air at the mouth of the harquebuss, which generates the sound, will be much attenuated by the emission of sound through those holes in

the middle of the barrel, before that the air inclosed arrive at the mouth of the harquebuss. Therefore it is probable that the sound and boom shall by many parts be diminished.

OF THE REPERCUSSION OF SOUNDS AND ECHO.

The repercussion of sounds (which we call echo) can be taken for an argument that sound is not a local motion of the air; for if it were, the repercussion should be made in manner conformable to the original, as happens in all corporeal repercussions. But in sound, wherein such an exact generation is required, as in the voice, which hath so many organs, and in musical instruments, which be curiously framed, the things which yield the repercussed sound have nothing such, but are merely rude, having almost nothing save this, that sound passes not through them.

OF THE CONSENTS AND DISSENTS OF AUDIBLES AND VISIBLES, AND OF OTHER SO CALLED SPIRITUAL SPECIES.

They agree in these:

Both are diffused in a spherical compass or orb, and fill the whole area of that sphere, and are carried to very distant spaces, and wax faint by degrees, according to the distance of the object, then vanish. Both carry their figurations and differences into minute portions of their orb, entire and unconfused, so as they are perceived through small crannies no otherwise than in an open place.

Both are of exceedingly sudden and swift generation and dilation, and conversely they are extinguished, and perish suddenly and quickly.

Both take and convey minute and exquisite differences, as of colours, figures, motions, distances, in visibles; of articulate voices, of musical tones, and of their swift changes and trepidation, in audibles.

Both, in their virtue and force, appear neither to emit any corporeal substance into their mediums or their orb, nor even to give forth or provoke a local perceptible motion in their mediums, but to convey certain spiritual species, of which the nature and manner is unknown.

Both appear to be not generative of any other virtue or quality beside their proper virtue, and so far to work, being else barren.

Both in their proper action appear, as if corporeally, to

work three things. The first, that the stronger object drowns and confounds the weaker; as the light of the sun, the light of a candle, the report of ordnance, the voice. The second, that the more excellent object destroys the weaker sense; as the light of the sun, the eye, a violent sound close at the ear, the hearing. The third, that both are repercussed, as in mirrors and the echo.

Neither doth the object of the one confound or hinder the object of the other; as light or colour, sound, or contrariwise.

Both affect the sense in animals, and that by objects in greater or less degrees grateful or odious: but they affect also after their own manner inanimates proportionate, and having (as seemeth) a conformity with the organs of the senses; as colours, a mirror, that is crystalline like the eye; sounds, the places of reverberation, which seem, likewise, to resemble the bone and cavern of the ear.

Both work diversely, accordingly as they have their mediums well or ill disposed.

To both the medium the most conducible and propitious is the air. In both the stretching of the sense, and, as it were, its erection to perceiving, availeth somewhat in more nice objects.

They differ in these:

The species of visibles appear to be as if emissions of beams from the visible body, almost like odours. But the species of audibles appear more to partake of a local motion, like the percussions which are made in the air: that whereas bodies for the most part work in two manners, by communication of their nature, or by an impression or signature of their motion, that diffusion in visibles appeareth more to partake of the former manner; in audibles, of the latter.

The dilation of sounds appears to be more evidently carried by the air than of visibles. For I judge that a vehement wind shall not so much hinder any visible afar off, as a sound; I understand the wind blowing contrary.

It is a notable difference, whence also many less differences flow, that visibles (original light excepted) are not carried but by right lines, whilst sounds are carried by arcuate lines.

Hence it happens, that visibles confound not one another, that are represented together: sounds contrarily. Hence it happens, that the solidity of the substance seems not

greatly to hinder sight, provided only the positions of the parts of the body be after a simple order and with straight passages, as in glass, water, crystal, diamond; but a little silk or linen cloth breaks the sight, though they be bodies very thin and porous; but cloths of this kind little or nothing hinder hearing; which those solids do exceedingly. Hence it happens, that unto the reverberation of visibles a small mirror suffices, or like transpicuous body, let it be only placed in a right line, where the visibles pass; but unto making of the reverberation of echo, it needeth also to confine the sound from the side, because it is carried to all sides. The visible object is further carried, in proportion, than sound.

Visibles, too neatly approached to the eye, are not so well seen as at some little distance, so as the beams may meet in a more acute angle; but in hearing, the nearer the better. But herein there may be twofold error. The first, because to seeing there is required light; but if the object be brought very near to the eye, this is shut out. For I have heard of one trustworthy, which was cured of cataracts of the eyes, when the little silver needle moved over the very pupil of his eye, and did touch it, he without any medium (that silver needle being far narrower than the pupil itself of the eye) saw perfectly the needle. The second, that the cave of the ear is distinctly interposed before the organ of hearing, so as being without, the sound is altogether unable to touch the bone and membrane of hearing.

The species of sight are more swiftly conveyed than sounds, as appeareth in the flash and report of guns; also in lightning and thunder, where the thunder is heard after a while.

I conceive also that the species of sound do hang longer in the air than visibles. For although neither do these perish on the instant, as we see in a ring spinning, and lute-strings fillipped, and in twilight and the like; yet I deem that sounds, for that they are carried by the wind, stay longer.

The beams of light being gathered, induce heat also, which is an action diverse from the visible quality. In like manner, if it be true that shouts have cast down birds flying over, that is also an action exceedingly diverse from the audible quality.

There seemeth not in visibles to be found an object as odious, and noisome to the sense, as in audibles; but they

affect it more evenly; for things foul to sight rather offend by moving of the fancy concerning foul things than of themselves; but in audibles the grating of a saw that is sharpened, and other like sounds, cause an horror; and a discordant note in music is in straightways refused and loathed.

It is not assured, that there is refraction in sounds, as in beams. But doubtless sounds do rebound: but that is to be ascribed to reflexion. For I do not think, if sounds pass through diverse mediums, as air, cloth, wood, that there be one place of the sound, where it is carried, another where it is heard, which is the property of refraction; but refraction seems to depend upon action, in right lines, which pertains not to sound.

But contraction of sound, and its dilatation, according to the disposition of the medium, happens undoubtedly, as in the speaking of puppets, and under water: the sound is contracted within that cell, which abroad is dispersed; as by mirrors visibles are dilated and contracted.

A tremulous medium (as smoke in visibles) makes the visible objects also to tremble; but in sounds nothing such is yet found, unless perchance the rise and fall, by winds. For the trembling in the nightingale-pipe is trembling of the percussion, not of the medium.

Going from great light into the dark, or out of the dark into light, the sight is some little confused; but whether the like be after very loud noises, or a great silence, would be inquired.

OF THE QUICKNESS OF THE GENERATION, AND EXTINCTION OF SOUND, AND THE TIME IN WHICH THEY ARE EFFECTED.

All sound is exceeding quickly generated, and quickly perishes. But the swiftness of its motion and of its differences, appears a thing not so wonderful. For the motion of the fingers upon a lute, or of the breath in the pipe or flute, are found to be exceedingly swift: and the tongue itself (no very exquisite organ) goes through as many motions as letters; but that sounds should not only be so speedily generated but that they should also, by their momentary force and impression, as it were, suddenly fill so great space, is matter worthy of the highest admiration. For instance, a man in the middle of a field speaking aloud is heard for a quarter of a mile, in a round, and that in

articulate words, and these hanging in every little portion of the air, and all in a space of time far less perhaps than a minute.

To inquire of the space of time in which sound is conveyed. It can be found thus. Let a man stand in a steeple by night; let another stand in the field, a mile off, perhaps, or as far as the bell can be heard, and let him have ready a torch lighted, but covered. Then let him in the steeple strike the bell: then let the other, who stands in the plain, as soon as he hears it, lift the torch: in this way, by the space of time between the striking of the bell and the seeing of the torch, shall he that stands in the steeple discover the time of the motion of the sound.

In guns, the flame is seen sooner than the report is heard, although the flame follow the discharging of the ball; so as the flash issues later, but sooner strikes the sense. Whence it is rightly gathered, that the beams visible are more speedily diffused and arrive than the species or impressions of sound.

OF THE AFFINITY, OR NON-AFFINITY, WHICH SOUND HATH WITH THE MOTION, LOCAL AND PERCEPTIBLE, OF THE AIR IN WHICH IT IS CARRIED.

Sound doth not appear manifestly and actually to shake and trouble the air, as doth wind; but the motions of sound appear to be effected by spiritual species; for thus we must speak, until something more assured shall be found.

So as I conceive that a very loud sound of one shouting, at a little distance from the very motion of the breath, shall scarcely stir any trembling aspen leaf, or straw, or flame.

But in greater pulsations there is found a very bodily and actual motion of the air; but whether that proceed from the motion itself which generates sound, or from a collateral cause, or some concomitants, appeareth not. Thunder claps sometimes make glass windows to tremble, and even walls: I think also that ordnance let off, or explosions of mines do the same.

And I remember, if I mistake not, that there is at King's College, in Cambridge, a certain wooden building, in which there hang bells, and that when the bells ring, it is shaken. But whatsoever that hidden motion be, which is

sound, it appears that neither is it engendered without perceptible motion in the first pulsation, and that again by the perceptible motion of the air, it is carried or hindered.

A word quietly uttered, which at a distance perhaps of thirty feet can be heard, will yet hardly stir the flame of a candle, that is held within a foot of the mouth; whilst blowing a little strongly with the mouth shall make the flame to waver, at a much greater distance.

The sound of bells, and the like, comes louder, and goes off more dully, as the wind blows towards the ear, or against the sound. The same happens in a shout, which being utttered against the wind, is not heard so far.

It is delivered, that through vast shouts of numbers applauding and cries of rejoicing, the air has been so broken or rarefied, that birds flying over have fallen down. There runs an opinion that the noise of many bells ringing in populous cities is good against thunder and pestilence.

Some places and buildings are certainly reported to be so vaulted, that if one speak in them, and (as the report hath it) against the wall, in one part of the building, his words shall be better heard at some distance from the voice than close at hand.

I have observed, sitting in a coach with one side of the boot down, and the other up, that a beggar crying on the closed side of the coach hath seemed to cry on the open side; so as the voice was plainly repercussed, and went round, or at the least, whilst it sounded on all sides, it seemed to be heard on that side, on which it did best reach the sense.

If a candle be held to the wind-hole of a drum, and the drum be beat, the flame is shaken and extinguished. The same happens in winding of a hunter's horn, if the candle be brought near the mouth of the horn, &c.

Even the exquisite differences which sound takes, and carries them with it, shew that these delicate affections are not continued local motions. For seals, in a matter fitly prepared, make exquisite impressions; so as in the generation of sound this same, perhaps, might happen. But the dilation and continuance sort not, especially in liquids: but those exquisite differences we understand of articulate voices and musical tones.

But of this matter altogether (*videlicet*, what relation and correspondency sound has to the local motion of the air) let inquiry be more diligently made; not by the way,

whether? (which sort of question in matters of this kind has ruined all) but by the way, *how far?* and that not by arguments discursive, but by opposite experiments and crucial instances.

OF THE COMMUNICATION OF THR AIR PERCUSSED AND ELIDED WITH THE AMBIENT AIR, AND BODIES, OR THEIR SPIRITS.

In the striking of a bell, the sound given by chiming upon the bell with an hammer on the outside, and by the tongue within, is of the same tone. So that the sound yielded by the chiming upon the outside, cannot be generated by the collision of the air, between the hammer and the outside of the bell, since it is according to the concave of the bell within. And if it were a flat plate of brass, and not concave, the sound should, I think, be different.

If there be a rift in a bell, it gives a hoarse sound, not pleasant or grateful.

It would be known how the thickness of the percussed body may affect the sound, and how far forth: as if of the same concave, one bell should be thicker, another thinner. I have proved in a bell of gold, that it gave an excellent sound, nothing worse, yea better, than a bell of silver or of brass. But money of gold rings not so well as money of silver.

Empty casks yield a deep and resounding sound, full ones a dull and dead sound. But in the viol, and the lute, and other such, although the first percussion be between the string and the exterior air, yet that air straight communicates with the air in the belly, or concave of the viol or lute. Wherefore in instruments of this kind is ever some perforation made, that the outward air may communicate with the confined air, without which the sound would be dull and dead.

Let there be a trial made of the nightingale-pipe, that it be filled with oil, and not with water; and let it be noted, how much softer or more obtuse the sound shall be.

When sound is created between the breath and the percussed air, as in a pipe, or flute, it is yet so produced, as it hath some communication with the body of the flute, or pipe. For there is one sound produced in a trumpet of wood, another in one of brass; another, I judge, if the trumpet were lined within, or perhaps even covered, on the outside, with silk or cloth: one perchance if the trumpet

were wet, another if dry. I conceive, likewise, in virginals, or the viol, if the board upon which the strings are strained were of brass, or of silver, it should yield a somewhat different sound. But of all these things let there be better inquiry.

Further, in respect of the communication, it would be inquired, what the diversity and inequality of bodies may do; as if three bells should be made to hang, the one within the other, with some space of air interposed, and the outer bell were chimed upon with an hammer, what sound it should give, in respect of a single bell.

Let a bell be covered on the outside with cloth or silk, and let it be noted, when the bell is struck by the tongue within, what that covering shall do to the sound.

If there were in a viol a plate of brass, or of silver, pierced with holes, in place of that of wood, it would be seen what this shall do to the sound.

There are used in Denmark, and are even brought hither, drums of brass, not of wood, less than those of wood, and they give, I think, a louder sound.

The agitation of the air by great winds shall not, I think, yield much sound, if woods, waves, buildings, or the like be away; yet is it received that, before tempests, there be some murmurings made, in woods, albeit to the sense the blast be not yet perceived, nor do the leaves stir. (*a*)

(*a*) Three chapters are deficient, which there wanted leisure to completing.

SERMONES FIDELES,

SIVE

INTERIORA RERUM.

ILLUSTRI ET EXCELLENTI DOMINO

GEORGIO, DUCI BUCKINGHAMIÆ,

SUMMO ANGLIÆ ADMIRALLIO.

HONORATISSIME DOMINE,

SOLOMON inquit, "Nomen bonum est instar unguenti fragrantis et pretiosi;" neque dubito quin tale futurum sit nomen tuum apud posteros. Etenim et fortuna, et merita tua, præcelluerunt. Et videris ea plantasse quæ sint duratura. In lucem jam edere mihi visum est delibationes meas, quæ ex omnibus meis operibus fuerunt acceptissimæ: quia forsitan videntur, præ cæteris, hominum negotia stringere, et in sinus fluere. Eas autem auxi, et numero, et pondere; in tantum, ut plane opus novum sint. Consentaneum igitur duxi, affectui, et obligationi meæ, erga illustrissimam dominationem tuam, ut nomen tuum illis præfigam, tam in editione Anglica, quam Latina. Etenim, in bona spe sum, volumen earum in Latinam, (linguam scilicet universalem,) versum, posse durare, quandiu libri et literæ durent. Instaurationem meam Regi dicavi: Historiam regni Henrici Septimi, (quam etiam in Latinum verti,) et portiones meas Naturalis historiæ, Principi: has autem delibationes illustrissimæ dominationi tuæ dico; cum sint, ex fructibus optimis, quos gratia divina calami mei laboribus indulgente, exhibere potui. Deus illustrissimam dominationem tuam manu ducat.

Illustrissimæ dominationis tuæ

Servus devinctissimus et fidelis,

FR. S. ALBAN.

SERMONES FIDELES.

I. DE VERITATE.

"QUID est veritas?" inquit Pilatus derisor; nec præstolari voluit responsum. Certè sunt, qui cogitationum vertigine delectantur; ac pro servitute habent, fide fixa aut axiomatis constantibus, constringi; liberii arbitrii usum in cogitando, non minus quam in agendo, affectantes. Cujusmodi quidem sectæ philosophorum licet defecerint; supersunt tamen ingenia quædam ventosa et discursantia, quibus eædem omnino venæ, licet non pari, cum antiquis, copia sanguinis repletæ. Verum, nec difficultas sola, laborque quem homines subeunt, in veritate invenienda; nec quæ ex ea inventa cogitationibus imponitur captivitas, mendaciis favorem conciliat; sed ipsius mendacii naturalis (utcunque corruptus,) amor. E recentiore Græcorum schola quidam, rem ad examen vocans, hæret attonitus; dum excogitare nequit, quorsum mortales amarent mendacium, ipsius mendacii causa; cum nec voluptati sit, ut mendacia poëtarum; nec utilitati, ut illa mercatorum. Sed nescio quomodo, veritas ista, (utpote nuda et manifesta lux diurna,) personatas hujus mundi fabulas, ineptiasque, non tam magnifice et eleganter ostendit, quam tædæ, lucernæque nocturnæ. Ad unionis, forsan, valorem, pervenire poterit veritas, quæ per diem speciosissima apparet: sed ad pretium adamantis, aut carbunculi, qui lumine vario pulcherrime splendent, nunquam ascendet. Mixtura mendacii voluptatem semper auget. Ecquis dubitat, si e mentibus hominum tollerentur opiniones vanæ, spes blandæ, æstimationes rerum falsæ, imaginationes ad libitum, et id genus alia, quin multorum animi relinquerentur dejecti, et marcidi, atræ bilis et languoris pleni, as sibimet ipsis ingrati ac displicentes? Patrum unus, magna cum

severitate, poësin appellat, vinum dæmonum; eò quod phantasiam vanis impleat; licet poësis mendacii tantum umbra sit. Verumtamen, non est mendacium, mentem pertransiens, quod officit; sed mendacium, quod a mente imbibitur, nempe ejus generis, de quo ante diximus. Verum utcunque in depravatis hominum judiciis, et affectibus, hæc ita se habeant; veritas tamen, (quæ sola se judicat,) docet; veritatis inquisitionem, quæ eam, proci instar, demeretur; veritatis cognitionem, quæ presentem eam sistit; et veritatis receptionem cum assensu, quæ est ipsius fruitio et amplexus; summum esse humanæ naturæ bonum.

Prima, in operibus sex dierum, creatura Dei, fuit lux sensus; postrema, lux rationis; quin et opus ejus, sabbatho, quod deinceps perpetuo exercet, est Spiritus sui illuminatio. Primo inspiravit lumen in faciem materiæ, vel molis indigestæ; postea in faciem hominis; quin et usque semper lucem inspirat in faciem electorum. Poëta, qui sectam, alioqui cæteris inferiorem, ornavit, elegantissime dixit; "Suave est in litore stanti videre naves fluctibus exagitatas; suave ad arcis fenestram stanti, prælium commissum, ejusque varios eventus, inferius spectare; sed nulla voluptas æquiparari potest huic ipsi, nempe ut quis stet super clivum excelsum veritatis" (collem certe inaccessibilem, ubi aër semper liquidus est, et serenus) "atque inde errores, homines palantes, caligines, et tempestates, in convalle subjacente, despiciat:" modo prospectus iste cum misericordia conjunctus sit, non cum tumore, aut superbia. Et hoc ipsum est cœlo in terris frui, quando mens humana in charitate movetur, in providentia quiescit, et supra polos veritatis circumfertur.

Jam vero, ut a theologica et philosophica veritate, ad veritatem, aut potius veracitatem in civilibus negotiis, transeamus; agnoscent vel ipsi, qui eam non exercent, apertam, et minime fucatam, in negotiis gerendis, rationem, præcipuum esse humanæ naturæ decus: mixturam autem falsi similem esse plumbeæ materiæ, quæ efficit sane ut facilius cudi possit metallum, sed ita ut interim vilius fiat. Nam flexuosi isti, et obliqui motus, serpentum sunt: qui super ventrem suum gradiuntur, non pedibus incedunt. Non est vitium, quod tanto hominem pudore obruit, quam si falsus vel perfidus inveniatur. Itaque acutissime Montaneus, rationem scrutatus, cur mendacii vocabulum, pro tanto haberetur opprobrio, et contumelia; Si res recte perpendatur, (inquit,) qui dicit hominem mentiri, eadem operâ dicit, eum adversus Deum audacem esse, adversus

homines timidum. Mendax enim, Deo insultat, homini se incurvat. Certe, quam flagitiosa res sit, falsitas, et perfidia, nullo modo exprimi potest melius, quam quod istis, (quasi ultimis clamoribus,) devocabuntur judicia Dei in genus humanum. Prædictum enim est, Christum in adventu suo secundo, "non reperturum fidem super terram."

II. DE MORTE.

METUUNT homines mortem, ut pueri tenebras. Quemadmodum autem, metus iste naturalis, in pueris augetur, fabulosis quibusdam terriculamentis, ita et ille alter. Sane, mortis meditatio, prout mors stipendium est peccati, et ad aliam vitam transitus, pia est et salubris; metus vero ejus, ut est naturæ debitum, res est infirma, et inanis. Inest tamen nonnunquam piis meditationibus, fermentum aliquod vanitatis, necnon superstitionis. Præcipitur in libris nonnullis religiosorum, qui tractant de mortificatione, ut recogitet secum homo, quantus sit dolor, cum vel minimus digiti articulus torqueatur; atque inde æstimet, quantus sit in morte cruciatus, ubi totum corpus corrumpitur, et dissolvitur. Cum tamen mors sæpenumero transeat minore cum dolore, quàm sentitur in tortura membri. Partes enim maxime vitales non sunt maxime sensitivæ. Nec abs re dictum fuit, ab illo, qui locutus est ut philosophus tantummodo, et homo animalis; "Pompa mortis magis terret, quam mors ipsa:" gemitus et singultus, membrorum convulsiones, oris pallor, amici flentes, et atrata funera, cum similibus, hæc sunt quæ mortem ostentant terribilem. Observatione plane dignum est, nullam esse animi passionem tam debilem, quin superet, et in ordinem redigat timorem mortis. Ideoque mors, non est hostis adeo formidabilis, cùm tam multos habeat homo circa se athletas, qui in certamine illam vincant. Ultio de morte triumphat; amor eam parvi facit; honor ambit; metus ignominiæ elegit; mœror ad eam confugit; metus anticipat. Imo legimus, quod postquam Otho imperator seipsum interfecisset, ipsa misericordia, (quæ affectus est omnium tenerrimus,) multos provocarit ad commoriendum, ex mera animi compassione erga dominum suum, ut fidissimos asseclas. Quin et addit Seneca fastidium, et satietatem: "Cogita quam diu eadem feceris; mori velle non tantum fortis, aut miser, sed etiam fastidiosus potest." Nec minus observatu dignum est, quantillam mutationem in animo generoso et

forti, appropinquans mors efficere valeat; eosdem enim gerunt homines illi spiritus, usque ad extremum momentum. Mortuus est Augustus Cæsar, voce certe urbana: "Livia, conjugii nostri memor, vive, et vale." Tiberius inter dissimulandum; ita enim de illo Tacitus; "Jam Tiberium vires, et corpus, non dissimulatio, deserebant." Vespasianus cum scommate; exonerans enim se super sella: Ut puto Deus fio. Galba cum gnoma: "Feri, si ex re sit populi Romani:" protendens simul collum. Septimius Severus, inter expedienda negotia: "Adeste, si quid mihi restat agendum." Pariter et alii. Certe Stoici, nimium insumpserunt operæ in solatia mortis: etenim grandi suo, contra eam, apparatu, effecerunt, ut terribilior videretur. Rectius ille, "qui finem vitæ extremum inter munera ponit naturæ." Æque enim est naturale hominibus mori, ac nasci; atque infans forsan, non minorem sentit dolorem ex hoc, quam ex illo. Qui moritur inter prosequendum magnum aliquod desiderium, ita se habet, ut vulneratus, sanguine adhuc fervente, qui plagam vix sentit. Itaque mens, in aliquod bonum fixa et intenta, a doloribus mortis se subducit. Verum enimverò, super omnia, suavissimum canticorum est illud, "Nunc dimittis;" cum quis fines suos, et exspectationes honestas, assecutus fuerit. Hoc item in se habet mors, ut bonæ famæ januam aperiat, et livorem extinguat:

Extinctus amabitur idem.

III. DE UNITATE ECCLESIÆ.

Cum religio sit præcipuum humanæ societatis vinculum, par est, ut et ipsa, debitis veræ unitatis et charitatis vinculis, astringatur. Dissidia circa religionem, mala erant, ethnicis incognita. Nec mirum, cum religio ethnicorum posita esset potius in ritibus, et cultu Deorum externo, quam in constanti aliqua confessione, et fide. Facile enim est conjicere, cujusmodi fuerit illorum fides, cum præcipui ecclesiæ ipsorum doctores et patres, fuerint poëtæ. Inter attributa autem veri Dei ponitur, quod sit Deus zelotypus: itaque cultus ejus non fert mixturam, nec consortium. Quamobrem pauca quædam de unitate in ecclesia dicemus. Scilicet, qui sint ejus fructus, qui limites, quibus denique modis concilietur.

Unitatis fructus præcipui, (præterquam quod Deo summè placeat, id quod ante omnia poni debet,) sunt duo. Alter

respicit eos, qui extra ecclesiam sunt; alter eos, qui intra. Quod ad priorem attinet, certum est, longè maxima in ecclesia scandala, esse hæresses, et schismata; ut quæ etiam corruptelas morum superent. Quemadmodum enim in corpore naturali, vulnera, et solutio continuitatis, genere pejora sunt, quam humores putridi; similis est corporis spiritualis ratio. Adeo ut nihil reperiatur, quod æque homines, ab ingressu in ecclesiam absterreat, aut jam receptos expellat, ac unitatis violatio. Itaquè temporibus quibus illud increbrescit, ut alii dicant, "Ecce in deserto;" alii, "Ecce in penetralibus;" hoc est, dum quidam Christum quærunt in hæreticorum conciliabulis, quidam in facie ecclesiæ externa, opus est prorsus, ut illa vox aures hominum quasi perpetuo feriat; Nolite exire. Doctor ille gentium, cujus vocatio et missio, propria et demandata, ei imposuit, ut eorum, qui extra ecclesiam fuerant, curam gereret, inquit, "Si ingrediatur cœtus vestros infidelis quispiam, aut idiota, et vos variis loquentes linguis audiat, annon vos insanire prædicabit?" Nèque sane, multo melius se habet, cum athei, et homines profani, tantas, in religione, lites, et opinionum dimicationes, intueantur. Siquidem hæc res ab ecclesia illos avertit, et in cathedra derisorum sedere facit. Levius quiddam videatur, quam ut in tractatu tam serio citetur, deformitatem tamen rei egregie depingit. Insignis quidam jocandi artifex, in catalogo librorum bibliothecæ cujusdam fabulosæ, inter cæteros, cum hac inscriptione, librum ponit: "Saltationes florales, et gesticulationes hæreticorum." Nemo enim est ex iis, qui non peculiarem quendam motum corporis ridiculum, et gestus deformitatem, exhibeat: unde fieri non potest, quin homines carnales, et politici degeneres, subsannent, qui facile in contemptum rerum sacrarum feruntur. Quantum ad fructus unitatis, qui ad eos, qui intra sunt, redundat, is, uno verbo, pax est, quæ innumeras benedictiones complectitur. Etenim fidem stabilit, charitatem accendit; quin et externa ecclesiæ pax in pacem internam conscientiæ sensim distillat; laboresque scribentium, et legentium controversias, vertit in tractatus pietatis, et mortificationis.

Quantum ad terminos et limites unitatis, vera procul, dubio et justa eorum collocatio; magni prorsus est, ad omnia in religione, momenti. Duo autem in iis statuendis videntur fieri excessus. Hominibus enim zelo fervidis, omnis pacificationis mentio est odiosa; "Numnam pax, Jehu? Quid tibi cum pace? Vade post me." Quasi pax nihil esset ad rem, sed sectæ et partes. Contra, quidam

tanquam Laodicenses, in causis religionis tepidi, putant capita religionis, nexu se commodo, colligare posse, per vias medias, et opiniones utrinque participantes, et reconciliationes ingeniosas; ac si pro arbitris se gerere vellent, inter Deum et homines. Uterque excessus vitandus; quod fiet, si fœdus inter Christianos, ab ipso Servatore nostro, descriptum, in clausulis illis, quæ primo intuitu, inter se opponi videntur, perspicuam et planam interpretationem sortiatur. "Qui non nobiscum est, contra nos est;" et rursus, "Qui contra nos non est, nobiscum est." Hoc est, si capita religionis, plane essentialia et fundamentalia, rite discernantur et distinguantur, a capitibus, quæ non sunt ex fide, sed ex opinione probabili, et intentione sancta, propter ordinem, et ecclesiæ politiam, sancitæ. Hoc vero plurimis videri possit, triviale quiddam, in quo quis actum agat: verum si hoc ipsum, minore partium studio, fieret, majore etiam consensu reciperetur. In hac re consilii nonnihil impertiri visum est, pro captus nostri tenuitate. Videndum est, ne homines ecclesiam Dei lacerent, per duo controversiarum genera. Primum est, cum controversiæ materia levior est, nec tanta contentione, quanta circa eam excitatur, digna; contradictione sola inflammata. Quemadmodum enim acute, et eleganter notatum est, ab uno ex patribus; "Tunica Christi inconsutilis fuit, at vestis ecclesiæ versicolor." Unde præcipit; "In veste varietas sit, scissura non sit." Differunt enim haud parum inter se, unitas, et uniformitas. Secundum est, cum materia quidem controversiæ pondus habet, sed ad nimiam subtilitatem ac obscuritatem redacta est: adeo ut ingeniosa quædam res esse videatur, potius quam solida. Videmus quandoque fieri, ut quis doctus, et intelligens, homines imperitos, de aliqua quæstione inter se litigantes, audiat; atque perspicue advertat, eos idem re ipsa sentire, et in unum convenire, quibus tamen ipsis nunquam fuisset aliquis dissidendi finis. Quod si hoc nonnunquam eveniat, in exigua illa judicii disparitate, quæ inter homines esse potest; annon credere par est, Deum in cœlis, qui corda scrutatur et novit, satis perspicere, nos homines fragiles, in aliquibus, de quibus controversiam movemus, idem revera sentire, et in ambobus benigne complacere. Hujusmodi controversiarum natura, et character, optime a D. Paulo exprimitur, in monito illo ac præcepto, quod circa illud adhibet: "Devita profanas vocum novitates, et oppositiones falsi nominis scientiæ." Creant sibi homines oppositiones, quæ revera nullæ sunt, easque in nova vocabula effingunt, et cudunt; que tam

fixa sunt et invariabilia, ut ubi sensus vocabulum regere debeat, vocabulum imperet sensui. Sunt etiam, ut controversiarum, ita unitatis, species duæ; quæ adulterinæ censeri possunt. Altera, cum pax ignorantiæ tantum implicitæ innititur. Coloribus enim omnibus in tenebris bene convenit. Altera, quæ consuta est et sarcita, ex positionibus ex diametro inter se contrariis, in capitibus nimirum fundamentalibus. Veritas enim et falsitas, similes sunt ferro et luto in digitis pedum, imaginis, quam in somnis vidit Nebuchadnezzar; adhærere sane possunt, incorporari non possunt.

Jam quatenus ad modos, per quos conciliatur unitas, cavendum est hominibus, ne dum unitatem religionis procurent et muniant, leges charitatis, et societatis solvant, et demoliantur. Inter Christianos duo tantum recipiuntur gladii, spiritualis nempe, et temporalis. Uterque autem suum habet locum, et suo perfungitur munere, in religione Christiana propugnanda, et protegenda. Sed neutiquam arripiendus est gladius tertius, qui est Mahumetis, aut illi similis; hoc est, ut religionem bello propagemus, aut cruentis persecutionibus, vim conscientiis inferamus; exceptis casibus scandali aperti, et insolentis; blasphemiæ, aut machinationis adversus statum civilem: ne dum ut foveantur seditiones, animentur conjurationes, et rebelliones, gladius in manus populi transferatur, et similia; quæ omnia manifesto tendunt, ad majestatem imperii minuendam, et auctoritatem magistratuum labefactandam; cum tamen omnis legitima potestas sit a Deo ordinata. Hoc enim nihil aliud est, quam alteram ex tabulis legis, in alteram allidere; et in tantum homines ut Christianos intueri, ut interim obliti videamur, quod sint homines. Lucretius poëta, cum sibi ante oculos poneret, Agamemnonem, filiam propriam immolantem, exclamat,

" Tantum religio potuit suadere malorum."

Quid tandem dixisset, si ei laniena Parisiensis, aut conjuratio pulveraria in Anglia, innotuisset? Certe septies factus esset magis Epicureus, et atheus, quam fuit. Nam quemadmodum gladius temporalis, non temere, sed magno cum judicio, in casu religionis, stringendus est; ita monstri simile est, eum in manus populi tradi. Sibi habeant hoc anabaptistæ, et hujusmodi furiæ. Certe, insignis fuit illa blasphemia, cum diceret diabolus, " Ascendam, et ero similis Altissimo;" sed adhuc major blasphemia fuerit, si quis Deum introducat dicentem: " Descendam, et ero similis

principi tenebrarum." Quid autem hoc ab illo differt, si causa religionis descendat, et præcipitetur, ad crudelia et execrabilia scelera, principes trucidandi, in populorum vitas grassandi, et imperia funditus evertendi? Videter quidem hoc perinde esse, ac si quis descendentem faciat Spiritum Sanctum, in specie, non columbæ, sed vulturis, aut corvi; aut ex navi ecclesiæ erigeret vexillum piratarum, et assassinorum: quocirca, justum est, et id ipsum necessitas temporum flagitat, ut ecclesia doctrina sua, et decretis suis; principes gladio; omnesque literæ seu religiosæ sint, seu morales, caduceo suo; in barathrum inferni damnent, et detrudant in secula, hujusmodi facta, et doctrinas iis auctoritatem aliquam tribuentes; ut magna ex parte jam pridem factum est. Certe optandum esset, ut in omnibus circa religionem consiliis, ante oculos hominum præfigeretur monitum illud apostoli: "Ira hominis non implet justitiam Dei." Atque ut verum dicamus, optime, et prudentissime observatum est, ab uno ex patribus, profundæ sapientiæ viro, nec minus ingenue, et sincere, ab eodem prolatum, et evulgatum: "Eos, qui conscientias premi, iisque vim inferri suadent, sub illo dogmate, cupiditates suas subtexere, illamque rem sua interesse, putare."

IV. DE VINDICTA.

VINDICTA agrestis quædam justitia est; quæ quo magis humana natura serpit, eo fortius legibus severis est evellenda. Etenim injuria illata, legem tantummodo violat; at reposita, legem auctoritate sua plane spoliat. Certe, in vindicanda injuria, æqualem se quis inimico suo sistit; in remittenda vero, superiorem: regium enim est, ignoscere. Equidem memini dixisse Solomonem, "Honori est homini offensas præterire." Quod jam præteriit, in integrum restitui non potest; at prudentes sat habent præsentia et futura curare. Nugantur igitur, et se frustra conturbant, qui præteritarum rerum satagunt. Injuriam nemo, injuriæ ipsius causa, infert; verum, ut ex ea, lucri aliquid, aut voluptatis, aut honoris, sibi conciliet: cur igitur cuipiam succenseam, quod se potius quam me diligat? Quod si quis ex malignitate mera sit injuriosus; quid tum? etiam spina et rubus pungunt et lacerant, quia naturâ sua utuntur. Vindictæ præcipue excusationem merentur, in iis injuriis, de quibus lege cautum non est. At simul prospiciat quis, ut genus vindictæ, ejusmodi sit, quod non sit

legi obnoxium. Alias ipse sibi pœnam conduplicat, inimicus vero lucrum facit. Sunt, qui inter sumendam vindictam, cupiunt, ut læsi intelligant, unde malum illud sibi ingruerit. Nempe generosior est iste affectus: siquidem videntur illi, non tam ipsa ultione delectari, quam ut læsum facti sui pœniteat. At vili ingenio præditi, et malitiosi, instar sagittarum sunt, quæ per tenebras volant. Magnus dux Florentiæ Cosmus, acutissimum telum vibravit in amicos perfidos, aut incuriosos. "Legimus (inquit) et mandatum habemus, ut inimicis nostris ignoscamus; at nuspiam legitur, astringi nos, ad ignoscendum amicis:" verum Spiritus Job loquitur meliora: "Numnam (inquit) de manu Dei bona accipiemus, neque mala itidem quandoque sustinebimus?" Quod etiam, aliquo modo, de amicis dici par est. Hoc certissimum est, hominem qui vindictæ studet, sua vulnera refricare, quæ alias, sibi relicta, sanari et consolidari potuissent. Ultiones publicæ, maxima ex parte; prospere cedunt: quales erant, propter cædem Cæsaris, cædem Pertinacis, cædem Henrici quarti magni illius Galliæ regis, et aliorum complurium. At in vindictis privatis hoc minime tenet. Quin potius, homines vindicativi vitam fere agunt veneficarum, quæ ut aliis sunt exitiabiles, ita ipsæ plerunque exitum infaustum sortiuntur.

V. DE REBUS ADVERSIS.

GRANDE prorsus sonabat Seneca, more Stoicorum, cum diceret: "Bona rerum secundarum optabilia, adversarum mirabilia." Certe si miracalum recte ponatur illud, quod naturam superat, cernuntur miracula, maxime in calamitatibus. At priorem illam sententiam magniloquentia superat, alterum ex ejus dictis; et excelsius quiddam est, quam ethnico conveniat. "Vere magnum habere fragilitatem hominis, securitatem Dei." Sane hoc dictum in poësi fuisset tolerabilius, ubi transcendentia ista magis probantur. Ac ut verum dicamus, poëtæ hoc intactum non reliquerunt. Eadem enim fere res est, quæ adumbratur, in portentoso illo poëtarum antiquorum commento, quod mysterio videtur non carere; imo et statum Christianum non obscure referre; nimirum de Hercule; qui cum ad solvenda Promethei vincula proficisceretur (in Prometheo autem figura naturæ humanæ repræsentatur); oceani longitudinem in poculo figulino emensus est; ubi ad vivum Christiana constantia depingitur, quæ in fragili carnis testa, per mundi

fluctus, undique circumfusos, navigat. Verum ut a grandi-tate verborum, ad mediocritatem descendamus. Rerum secundarum præcipua virtus est temperantia, adversarum, fortitudo; quæ in moralibus reputatur pro virtute maxime heroica. Quin et res prosperæ, ad Veteris Testamenti benedictiones, adversæ, ad Novi beatitudines, pertinent: quæ, et reipsa majores sunt, et clariorem divini favoris revelationem exhibent. Attamen etiam in Veteri Testamento, si lyræ Davidis aures præbeas, plures invenias threnos, quam exultationes: Spiritus autem sancti calamus, diffusius tractavit, Jobi afflictiones, quam felicitatem Solomonis. Res prosperæ non sine plurimis timoribus et molestiis transeunt; adversæ itidem suis solatiis, et spe non vacant. Videmus certe in acupictis, melius placere, cum imagines coloris lucidioris sunt, stamen autem telæ, coloris magis opaci, quam cum stamen ipsum splendidius est, imagines autem tenebrosiores. Judicium igitur capi potest, quid cordi magis volupe sit, ex eo quod oculos magis delectat. Habet certe virtus simile quiddam odoramentis quibusdam pretiosis, quæ fragrantissima sunt, aut incensa, aut tusa. Nam fortuna prospera potissimum vitia hominum indicat, adversa virtutes.

VI. DE DISSIMULATIONE ET SIMULATIONE.

Dissimulatio est artium civilium compendium quoddam, et pars infirmior: etenim, et ingenium acre, et robur animi constans ad hoc requiritur, ut quis sciat, quando verum proferendum sit, atque id facere audeat. Itaque inter inferiores politicos reponuntur, qui magni sunt simulatores.

Quod discrimen, bene apud Tacitum, Cæsarem Augustum inter, et Tiberium, adnotatum est. Etenim de Livia sic ait: quod esset "Cum artibus mariti, et simulatione filii, bene composita. Artes imperii Augusto, simulationem Tiberio" attribuens. Idem alibi hisce verbis, Mucianum inducit, Vespasianum ad arma contra Vitellium sumenda hortantem: Non adversus Augusti acerrimam mentem, nec adversus Tiberii cautissimam senectutem, insurgimus. Quare hæ facultates, artium civilium, et simulationum, sunt prorsus distinguendæ. Esto igitur, ut sit felicis ita quisquam acuminis, tantæque perspicaciæ, ut distinguere queat, quæ palam facienda, quæ occultanda, quæ tanquam in crepusculo producenda, temporum etiam et personarum ratione pensitata (quæ revera artes sunt politicæ et civiles, ut

Tacitus eas recte appellat,) huic dissimulatio impedimento erit. Quod siquis, ad hunc judicii et discretionis gradum, ascendere non valeat, ei relinquitur tanquam tutissimum, ut sit tectus, et dissimulator. Ubi enim in singulis non datur eligere, ibi in omnibus caute insistere tutissimum est; cæcutientibus enim lente movendum. Sane ubique reperias homines rerum tractandarum peritissimos, omnes fere candorem, ingenuitatem, et veracitatem, in negotiis præ se tulisse: verum simul erant, tanquam equi, bene docti et domiti, qui subito se sistere, et se vertere, norant. Quod si necessitas quædam ingruat, dissimulationem profundam postulans, tunc quidem opinio et fama de bona fide et veracitate eorum, præconcepta, eos reddit prorsus invisibiles.

Consilia et mentem tegendi, aut velandi, gradus sunt tres. Primus est, taciturnitas, cum quis sensus animi sui premit, adeoque relinquit in æquilibrio, ut in quam partem propendeat, nemo facile conjecerit. Secundus dissimulatio in negativa, cum quis ex composito signa quædam et indicia jacit, se non eum esse, qui revera est. Tertius simulatio in affirmativa, cum quis aperte fingit et prætexit, se cum esse, qui revera non est.

Quantum ad primum horum, taciturnitatem scilicet; ea est certe virtus confessoris. Atque profecto, vir taciturnus multas audit confessiones; quis enim garrulo, et loquaci, pectus suum recludet? Quod si quis famam habeat viri taciturni, facile aliorum animos reserabit; sicut aër clausus apertum sugit: atque veluti delicta confiteri, non ad aliquem finem collimat, qui ad res civiles tendit, sed ad conscientiam sublevandam: ita certe homines taciturni, ad multarum rerum notitiam, simili de causa, perveniunt; dum homines, non tam impertire, quam exonerare animum suum cupiant. Ut paucis dicamus, mysteria silentibus debentur. Præterea, si verum loquamur, etiam in animo, æque ac in corpore, deformis et invenusta est nuditas: neque parvam addit reverentiam, consiliis et factis hominum, si minus pateant. At loquaces et futiles, etiam plerunque leves sunt, et creduli. Qui enim eloquitur quæ scit, effutiet etiam quæ nescit. Ponatur igitur pro certo, habitum taciturnitatis virtutem esse politicam et moralem. Sed et illud addendum est, bonum esse homini, ut vultus suus linguæ officium non præripiat. Nam, revelatio animi ex vultu, aut gestu, magnus est defectus, et quædam quasi proditio: eo magis, quod sæpenumero, plus notatur, et fidem facit, quam verba.

Quantum ad secundum, dissimulationem scilicet: ex necessitate quadam illa taciturnitatem sequitur. Adeo ut qui tectus esse vult, dissimulator aliquatenus vel nolens evadat. Etenim astutiores sunt homines, quam ut patiantur aliquem in æquilibrio se continere absque aliqua in alteram partem inclinationis suæ declaratione. Ita quæstionibus subtilibus eum obsidebunt, et allicient, et excutient, ut, nisi obfirmato et absurdo silentio se quis muniat, necesse ei fuerit, se nonnihil prodere: quinetiam si hoc non fecerit, ex silentio ipso, aliquid conjecturæ capient, non minus, quam ex verbis. Quod vero ad æquivocationes, et oracula verborum attinet, non poterunt illa diu valere. Ita ut nemo tectus esse queat, nisi aliquem dissimulationis gradum sibi indulgeat: quæ nihil aliud est, quam silentii quædam appendix, aut limbus.

Quantum vero ad tertium gradum; nimirum simulationem, et professionem falsam; illam magis vitiosam, et minus politicam, duco; nisi forte dignus vindice nodus inciderit. Itaque perpetua consuetudo simulandi, vitium est, aut ex ingenii lubricitate quâdam, vel timiditate, ortum; aut etiam, ex animi constitutione, quæ vitio aliquo magno imbuta est: quod, quia occultare oportet, simulationem etiam in aliis adhibere et exercere efficit, ne forte habitus ipse intercidat.

Commoda simulationis et dissimulationis tria. Primum est, quod oppositionem amoliatur, et homines imparatos aggrediatur, ubi enim consilia cujuspiam evulgata fuerint, adversarii, veluti tuba, excitantur. Secundum est, quod in hominis potestate relinquit, ut pedem referat, et se absque existimationis suæ jactura de negotio subducat. Si quis enim, se manifesta declaratione obstringit, is cuneis quasi impactis includitur; aut pergendum est ei, aut turpiter desistendum. Tertium est, quod ad aliena consilia detegenda viam aperiat. Etenim ei, qui sua consilia profert, non facile quis se adversarium profiteatur; verum assentabitur potius; et libertatem loquendi, in libertatem cogitandi, vertet. Itaque habetur apud Hispanos satis malignum adagium: "Dic mendacium et veritatem erues." Perinde ac si simulatio clavis esset ad secreta reseranda. Tria etiam sunt simulationis et dissimulationis incommoda, ut ex æquo res compensetur. Primum, quod illa timiditatem arguant: id quod omnibus negotiis, plumas vellit, ne perniciter ad metam advolent. Secundum, quod in ancipites cogitationes animos complurium conjiciant, qui fortasse alias cooperaturi fuissent, et studio suo rem promoturi;

unde sine socia et amica opera ad fines suos solus quis ambulet. Tertium est, (idque maximum,) quod præcipuo ad actiones organo, hominem privet; nimirum fide. Optimum fuerit temperamentum, si quis veracitatis famam obtineat, taciturnitatis habitum, dissimulationis usum tempestivum, et facultatem simulationis, ubi opus fuerit.

VII. DE PARENTIBUS ET LIBERIS.

GAUDIA parentum occulta sunt; nec minus dolores eorum, et metus. Illa certe verbis assequi nequeunt, hos autem proferre nolunt. Certe liberi labores humanos suaviores, verum infortunia amariora, reddunt. Curas vitæ multiplicant, sed memoriam mortis mitigant. Æternitas sobolis etiam brutis communis est; sed illa memoriæ, meritorum, et operum, propria est hominibus. Atque videre sane est, opera nobilissima, et fundationes, ab orbis profecta; quibus effigies animorum exhibere curæ erat, cum corporis imaginibus destituerentur. Adeo ut posteritati maxime studeant, qui posteritate carent. Qui honores in familiam suam primi introducunt, erga liberos indulgentissimi sunt: intuentur siquidem eos, non tantum ut continuationem speciei suæ, sed ut rerum a se gestarum hæredes: ideoque ut liberos et creaturas.

Gradus affectuum in parentibus erga liberos diversos, sæpe dispares sunt, aliquando iniqui: ac potissimum in matre. Unde Solomon dicit: "Filius sapiens lætificat patrem: filius vero stultus mœstitiæ est matri suæ." In domo fœcunda, et liberorum plena, cernere quandoque est, unum aut alterum ex senioribus pluris æstimari; atque ex junioribus in deliciis esse: sed in medio fortasse aliquos quasi oblivione transiri: qui nihilominus, haud raro, optimæ indolis evadunt. Illiberalitas parentum erga liberos suos error est plane noxius; nam eos reddit animo degeneres; fallaciis deditos; ignobilium consortio se delectantes: magisque ad luxum propensos, quando rerum copiam adepti sint. Itaque optime succedit, quando parentes suam, apud liberos, auctoritatem tuentur, crumenam laxant. Invaluit, tam apud parentes, quam pædagogos et famulos, mos quidem ineptus, æmulationes inter fratres serendi, et alendi, durante eorum pueritia; quæ sæpenumero in discordias evadunt, post ætatem virilem, et familias turbant. Itali non magnum ponunt discrimen, inter liberos, et nepotes, aut cognatos; sed, modo sint e

massa sanguinis, non multùm pensi habent, utrum sint corpore proprio editi, necne? Atque si verum dicendum sit, in naturâ non multum interest; adeo ut sæpe videamus, nepotem avunculo magis similem, aut cognato, quam parenti proprio, prout sanguis casu quodam derivatur. Curent parentes, in tenera ætate filiorum suorum, cui vitæ generi illos destinent: tum enim maxime sunt flexibiles, et cerei. Neque in hac electione respiciant nimis inclinationem filiorum ipsorum; quasi illud melius arrepturi sint, ad quod maxime videntur propensi. Verum est, si affectus, aut aptitudo puerorum, sit erga aliquod studium insignis, non expedire, ut quis naturæ, aut indoli repugnet: sed, ut plurimum præceptum illud sanum est: "Optimum elige, suave et facile illud faciet consuetudo." Fratres juniores plerunque sunt fortunæ filii: sed raro, aut nunquam, prosperum sortiuntur exitum, quando exhæredantur seniores.

VIII. DE NUPTIIS ET CŒLIBATU.

Qui uxorem duxit, et liberos suscepit, obsides fortunæ dedit; sunt enim magnorum conatuum impedimenta; sive ad virtutem tendat quis, sive ad improbitatem: certe præstantissima (ut alibi diximus) in usum reipublicæ opera, et merita, a viris profecta sunt, prole carentibus; qui tam affectu, quam fortunis, rempublicam connubio sibi junxerunt, et dotarunt. Attamen rationi videatur magis consentaneum, ut qui liberos relinquunt, majorem futurorum temporum curam gererent; ad quæ satis norunt, charissima illa sua pignora oportere transmitti. Sunt tamen, qui licet, liberis careant, tamen memoriæ suæ incuriosi sunt, et cogitationes vitæ tantum curriculo terminant, et tempora futura ut ad se nihil pertinentia, ducunt. Imo et alii nonnulli, uxorem et liberos, tantum in rationibus expensarum habent. Quinetiam reperiuntur aliqui fatui avari, qui gloriantur fere se liberis carere, ut habeantur tanto ditiores. Audiverunt scilicet aliquos dicentes, "Talis quispiam est ditissimus;" alios autem subinferentes, "At liberis compluribus oneratur:" quasi divitiarum hoc esset decrementum. Verum cœlibatus causa maxime frequens, est libertas; præsertim, in quibusdam animis sibi complacentibus et phantasticis; qui omnis restrictionis sensum nacti sunt tam acutum, ut cingula et periscelidas fere habeant pro vinculis et compedibus. Viri cœlibes optimi

sunt amici, optimi erga servos domini, servi etiam erga dominos optimi; at non semper subditi optimi; sunt enim ad fugam expediti; atque revera transfugæ fere omnes sunt ejus conditionis. Vita cœlebs ecclesiasticis bene convenit: non enim facile quis irriget solum, si prius stagni alicujus receptaculum interveniat. Judicibus et magistratibus res est fere indifferens: si enim faciles sint, et corruptelis dediti, servum aliquem videas uxore, multis modis, ad hujusmodi lucra captanda, deteriorem. Quod ad milites attinet, reperio certe duces, apud exercitus suos concionantes, illis in memoriam redigere solere, charitates uxorum et liberorum. Reperio etiam nuptiarum contemptum apud Turcas milites vulgares reddere viliores. Sunt certe porro, uxor et liberi, disciplina quædam humanitatis; atquæ cœlibes, etsi sæpenumero magis sint munifici et charitativi, quia fortunæ eorum minus exhauriantur; sunt tamen, ex altera parte, magis crudeles, et sine visceribus (idonei qui sint severi inquisitores) quia indulgentia et teneritudo affectuum suorum non tam sæpe evocatur, et excitatur. Naturæ graves, et consuetudine ductæ, ideoque constantes, sunt plerunque uxoriæ: ut de Ulysse perhibetur: "Vetulam suam prætulit immortalitati." Mulieres castæ sunt plerunque superbæ, et protervæ, merito pudicitiæ suæ elatæ. Inter vincula præstantissima castitatis, et obsequii uxoris erga maritum, illud censeri debet, si virum suum uxor prudentem putet; quod nunquam faciet, si eum inveniat zelotypum. Uxores, juvenum dominæ sunt; mediæ ætatis, sociæ; senum, nutrices. Adeo ut adsit ansa ad uxorem ducendam; ætatibus singulis. Inter sapientes tamen numeratus est ille, qui interrogatus: "Quod esset tempus opportunum nuptiarum?" respondit: "Juvenibus non adhuc, senibus non omnino." Sæpe fit, ut mariti deteriores bonas habeant uxores: sive hoc fiat, quod hoc modo pretium addatur mariti benevolentiæ, per vices; sive quod uxores in patientia sua glorientur. Hoc autem nunquam fallit, si hujusmodi mariti, ab uxoribus ipsis expetiti et electi fuerint, contra consensum amicorum: tunc enim, animus iis semper adest, ut stultitiæ suæ pœnitere non videantur.

IX. DE INVIDIA.

Ex affectibus nulli sunt, qui existimantur fascinare, præter amorem et invidiam. Uterque acria progignit desideria; uterque se perniciter efformat in phantasias, et suggestiones; atque uterque facile inscendit in oculos, (præcipue quando objectum adest); quæ omnia ad fascinationem faciunt; si modo fascinatio aliqua sit. Videmus etiam, Scripturam, invidiam, oculi mali nomine, insignire; atque astrologos, malos astrorum influxus, malignos aspectus, vocare. Ita ut, agnosci ab omnibus videatur, in invidia, ejusque operatione, ejaculatio quædam, et irradiatio ex oculis. Quin et nonnulli, tam extiterunt curiosi, ut notaverint tempora, quibus ictus et percussio oculi invidi, plurimum obest, tum præcipue esse, cum persona, in quam invidia torquetur, spectatur in gloria et triumpho: etenim hoc mucronem invidiæ acuit; atque insuper illis temporibus, spiritus personæ invisæ prodeunt maxime in exteriora, unde ictui occurrunt.

Verum, missis istis rebus curiosis, (licet non indignis, quæ in considerationem veniant, sed loco idoneo,) tractabimus hæc tria; qui sint ad invidendum maxime proclives; qui sint invidiæ maxime obnoxii; et quæ sit differentia inter invidiam publicam et privatam.

Qui virtutis ipse expers est, invidet virtuti alterius. Etenim animi hominum se pascunt et delectantur, aut bono proprio, aut malo alieno; quique primo alimento caret, satiabit se secundo; et qui nullo modo sperat se ad virtutem alterius pervenire posse, ipse fortunam ejus libenter deprimit, ut minor intercedat disparitas.

Vir curiosus, et se alienis rebus immiscens, ut plurimum, invidus est. Etenim, de rebus alienis multum inquirere, neutiquam eo spectare possit, quod operosa illa sedulitas suis rebus conducat: itaque fieri non potest, quin hujusmodi vir, scenicam quandam voluptatem capiat, aliorum fortunas spectandi: neque, qui rebus propriis tantum intentus est, segetem invidiæ multam reperiet. Invidia enim passio est cursitans, et plateas terit, nec domi se continet: "Non est curiosus, quin idem sit malevolus."

Viri natalibus nobiles, invidiæ erga novos homines, notam subeunt. Etenim mutatur intervallum. Et simile est hoc deceptioni visûs; cum res retrocedere videantur, aliis se promoventibus.

Deformes, et ennuchi, et senes, et spurii, invidi sunt.

Etenim qui conditionem suam, emendare nullo modo potest; conditionem alterius pro viribus suis labefactabit. Nisi forte hi defectus, in generosa et heroica ingenia, inciderint, quæ defectus proprios naturales in honoris sui incrementum vertere nitantur; scilicet, ut fama hoc arripiat, eunuchum, aut claudum, tam magna perpetrasse; miraculi nimirum honore affectato. Id quod evenit Narseti eunucho, et Agesilao, atque Tamberlani, qui claudi fuerunt.

Eadem fere ratio est hominum, qui e calamitatibus resurgunt. Sunt enim plerunque temporibus infensi; atque alienas calamitates, tanquam suarum molestiarum redemptiones, gustant.

Qui in plurimis excellere contendunt, levitate, et gloria vana moti, necesse est ut sint invidi. Ubique enim occurrunt objecta invidiæ: cum fieri nequeat, quin aliqui in tot rebus illos superent. Qui fuit character imperatoris Adriani, qui poëtas, et pictores, et opifices alios, in iis scilicet operibus, quibus ipse præcellere gestiebat, capitali quadam invidia prosequebatur.

Postremo propinqui, et collegæ, et unà educati, ad invidendum æqualibus, cum evehuntur, proni sunt. Etenim, exprobrat hoc illis fortunam propriam, eosque quasi digito monstrat, et frequenter eorum memoriam vellicat; quinetiam in aliorum notam hæc fortunæ collatio magis incurrit. Invidia autem, a fama et sermonibus, semper reflectitur, et conduplicatur. Unde invidia Cainis erga fratrem Abelem malignior fuit, quia cum sacrificium Abelis magis acceptum Deo fuit, nemo inspexit. Atque hæc de iis, qui ad invidendum proclives sunt.

Quantum ad illos, qui invidiæ, magis aut minus obnoxii sunt; primo, iis, qui eminente virtute præditi sunt, minus invidetur, cum promoventur: promotio enim eorum videtur ex debito; debiti autem solutioni nemo invidet, sed largitioni supra meritum. Atque etiam invidia non sine comparatione est; ubi autem nullus comparationis gradus, nulla invidia; itaque regibus non invidetur, nisi a regibus. Illud tamen observatione dignum est, personis indignis, sub primum honoris sui ascensum, maxime invideri; postea vero minus; ubi contra personæ dignæ, et meritis insignes, invidiam tum demum experiuntur, postquam fortunæ eorum diutius duraverint. Etenim, licet virtus eorum eadem maneat, tamen minus fit illustris: recentes enim oboriantur homines, qui eam obscurant.

Nobiles genere minus invidiæ expositi sunt, cum honoribus cumulantur: etenim nihil aliud videtur, quam debitum

majoribus suis repensum: præterea, parum fortunæ eorum additum videtur; invidia autem, more radiorum solis, in clivo ardentior est, quam in plano. Itaque eandem ob causam, qui per gradus evehuntur, minorem subeunt invidiam, quam qui per saltum.

Qui cum honoribus suis conjunctos habent labores magnos, curas, et pericula, invidia minus laborant. Etenim existimant homines, eos, honores suos, caro pretio emere, et misereri potius ipsorum nonnunquam incipiunt: misericordia autem semper fere sanat invidiam. Itaque notabis plerunque, ex viris politicis, et honore fulgentibus, magis sanos et sobrios, semper querimonias fundere, qualem vitam traducunt: canentes illud, Quanta patimur! non quod ita sentiant, sed quo invidiæ aciem retundant. Verum hoc intelligi debet, de negotiis, quæ hujusmodi viris imponuntur, non de iis quæ ipsi ad se attrahunt. Nihil enim invidiam magis suscitat, quam ambitiosum et immodicum negotiorum monopolium: nihilque e converso, invidiam extinguit magis, quam si quis in summis honoribus constitutus, aliis officiariis inferioribus, nihil detrahat. Hoc enim modo, quot illi ministri sunt, tot se tegit umbraculis ab invidia.

Super omnia, illi invidiam in se concitant maxime, qui fortunarum suarum amplitudinem, insolenter et tumide ostentant; nunquam sibi placentes, nisi dum potentiam suam jactent, vel per pompam exteriorem, vel triumphando de adversariis, aut competitoribus suis dejectis: ubi contra, viri prudentes sacrificare quandoque invidiæ ament, de industria interdum permittentes se vinci, in rebus, quæ minus eis cordi sunt. Nihilominus, illud verum est, potentiæ ostentationem apertam, et indissimulatam, (modo absit arrogantia et gloria inanis,) minore invidia laborare, quam si callide et quasi furtim se notæ subtrahat. Etenim, hoc cum fit, nihil aliud facit quis, quam ut fortunam insimulet, quasi ipse sibi esset conscius indignitatis suæ; unde alios ad sibi invidendum stimulat.

Postremo, ut huic parti finem imponamus; quemadmodum in principio diximus, invidiæ actum aliquid habere in se ex veneficio; ita non alia est invidiæ curatio, quam quæ solet esse veneficii, et incantationis: hoc est, sortis translatio, (ut vocant,) et in alium remotio. Ad quem finem, prudentiores ex honoratis, semper in scenam introducunt aliquem, in quem invidiam, in se alias incursuram, derivent: quandoque in ministros et servos, quandoque in collegas et socios; aut in alios quosdam eam rejicientes. Neque, ad hunc usum, unquam desunt personæ

aliquæ violentæ et temerariæ; quæ, modo potentiam et negotia agitent, ea quovis periculo mercari non dubitent.

Jam vero, ut de publica invidia loquamur. Ea saltem aliquid in se habet boni, ubi in privata invidia nihil prorsus inest boni. Publica enim invidia, instar salubris ostracismi est, qui viros magnos, supra modum excrescentes, coërcet; unde etiam fræno est viris præpotentibus, ne se nimium efferant.

Hæc invidia, quæ mala contentatio, modernis linguis appellatur, (et in titulo De seditionibus plenius tractabitur,) est in regnis et rebuspublicis contagioni non absimilis. Etenim sicut contagio in sanas partes serpit, easque corrumpit; ita etiam, quando invidia statum occupaverit, vel optima reipublicæ mandata et instituta, in odium vertit, et graveolentiam quandam. Itaque, parum proficitur intermiscendo actiones gratas et populares, odiosis; etenim hoc ipsum imbecilitatem et invidiæ metum arguit; quæ tanto magis nocet, ut sit etiam in contagionibus, quæ, si tibi ab iis metuas, facilius irruunt.

Ac publica ista invidia, magis in regum officiarios et ministros involat, quam in reges ipsos. Attamen ecce regulam quæ vix fallit; si invidia, quæ ministro incumbit, sit magna, causa autem parva; aut si invidia quasi generalis sit, et omnes statûs ministros complectatur; tunc invidia, (etsi occulto,) regem, aut statum ipsum, petit. Atque hæc dicta sint de publica invidia, aut contentatione mala; atque de ejus differentia ab invidia privata, quam priore loco tractavimus.

Addemus etiam, in genere, de affectu invidiæ, hoc insuper; eum inter omnes affectus esse maxime importunum, et assiduum. Etenim, aliis affectibus excitandis subinde præbetur occasio; recte autem dictum est, "invidiam festos dies non agere;" quia semper materiam se exercendi reperit. Unde etiam observatum est, amorem et invidiam, maciem hominibus inducere; id quod alii affectus non faciunt, quoniam non continui sunt. Est etiam invidia affectuum vilissimus et pravissimus: quam ob causum proprium est attributum diaboli; qui dicitur "Invidus homo, qui zizanias inter triticum, noctu seminavit:" quemadmodum etiam semper evenit, ut invidia callide, et in tenebris operetur, ad præjudicium cujusvis rei optimæ, veluti tritici.

X. DE AMORE.

Amori plus debet scena, quam vita. Etenim in scena, amor semper comœdiæ præbet argumentum; quandoque etiam et tragœdiæ; at in vita humana multum plerumque affert nocumenti; nunc ut Sirenum aliqua, aliquando ut Fruriarum. Observare licet, neminem ex viris magnis et illustribus fuisse (quorum extat memoria, vel antiqua, vel recens) qui adactus fuerit, ad insanum illum gradum amoris. Unde constat, animos magnos, et negotia magna, infirmam hanc passionem, non admittere. Excipere tamen oportet Marcum Antonium, imperii Romani duumvirum; et Appium Claudium, decemvirum, legislatorum inter Romanos principem. Quorum prior fuit revera homo luxuriosus, et voluptatibus deditus; alter autem vir fuit prudens et austerus. Unde quivis perspiciat, amorem, (quanquam rarius,) aditum reperire posse, non solum in cor apertum, sed et bene munitum, si diligenti custodia non asservetur. Abjectum quidem, et pusillanimum, est illud Epicuri dictum: "Satis magnum alter alteri theatrum sumus:" quasi homo natus ad contemplationem cœli, et cœlestium, idolum adorans minutum, satageret, se submittendo, si non ori, ut bruta, oculo tamen, certe ad altiora contemplanda dato.

Mira res videbitur, si passionis hujus excessum perpendamus, ac quomodo ipsi rerum naturæ, et valori vero insultet, vel hoc ipso, quod hyperbole perpetua nulli rei conveniat, præterquam amori. Neque hæc hyperbole solummodo in locutionis phrasi cernitur; cum enim verissime dictum sit, adulatorum principem, quocum cæteri adulatores minores conspirant, esse unumquemque sibi ipsi; profecto amator aliquid amplius est. Nunquam enim fuit quisquam adeo superbus, qui seipsum tam absurde magnifecerit, quam amator personam amatam. Recte itaque receptum est illud diverbium: "Amare, et sapere, vix Deo conceditur." Neque aliis tantummodo manifesta est hæc phrenesis, personæ autem amatæ minime; sed et amatæ potissimum, nisi amor sit reciprocus. Certissimum enim est, amorem semper rependi, aut amore mutuo, aut contemptu intrinseco et secreto. Quo magis cavendum est hominibus, ab hac passione; quæ non solum alias res perdit, sed et seipsam. Quæ alia infert damna, belle illa exprimit poëtarum fabula: "eum scilicet, qui Helenam prætulit, Junonis dona, et Palladis

amisisse." Quisquis enim amatoriis affectibus nimis indulget, et divitiis et sapientiæ nuncium remittit. Habet hæc passio æstus suos, in ipsis temporibus, quibus animus maxime mollis est et infirmus; nimirum in rebus prosperis, aut adversis: quanquam hoc posterius minus forsan observatum fuerit. Utraque enim tempestas amorem accendit, redditque flagrantiorem; unde evincitur esse stultitiæ proles. Optime illi, qui si amores omnino nequeant extrudere, eos tamen in ordinem redigunt; et a rebus seriis, vitæque negotiis, segregant. Si enim illis amor se immisceat, turbat omnia, hominesque eo compellit, ut fines suos recta petere non possint. Quicquid in re sit, viri militares amoribus dediti sunt; opinor, non aliter, quam vino. Poscunt enim plerunque pericula compensationem voluptariam. Inest ingenio humano, motus quidam arcanus, et tacita inclinatio, in amorem aliorum: qui si non insumatur, in unum, vel paucos, naturaliter se diffundit in plures; atque homines reddit humanos et charitativos: quemadmodum videre licet nonnunquam in monachis. Amor conjugalis genus humanum creat, amor socialis perficit; amor vero lascivus inficit, et dehonestat.

XI. DE MAGISTRATIBUS ET DIGNITATIBUS.

Viri in magistratu collocati, ter servi: servi principis vel politiæ; servi famæ; et servi negotiorum. Adeo ut libertate neutiquam fruantur; nec in personis, nec in actionibus, nec in temporibus suis. Mirum cupiditatis genus, potestatem appetere, libertatem amittere: vel potestatem in alios ambire, potestatem in seipsum exuere: ascensus ad dignitates arduus est; et per labores pervenitur ad labores majores: sæpe quoque indignitatibus non vacat; atque per indignitates pervenitur ad dignitates. Statio in dignitatibus res lubrica est; atque regressus, aut præcipitium est, aut saltem eclipsis; quæ et ipsa triste quiddam, et melancholicum. "Cum non sis qui fueris, non esse cur velis vivere?" Imo nec regredi datur, etiamsi quis cupiat; neque regredi volunt homines, cum ratio postulat ut id facerent; verum impatientes manent vitæ privatæ, etiam cum senectus aut infirmitas ingruit; quæ umbram et otium postulant, sicut oppidani senes, qui ante ostium sedere volunt, licet se eo pacto derisui exponant. Sane, viris in magistratibus positis, opus est, ut aliorum opiniones mutuentur, quo se ipsos beatos putent; nam si judicent ex sensu

proprio, nihil hujusmodi reperient; verum, quando secum cogitent, quid alii de ipsis sentiant, et quam libenter alii conditiones cum illis permutare vellent, tum demum beati sunt, tanquam rumore tenus: cum intus fortasse contrarium experiantur. Siquidem dolores suos primi omnium sentiunt, licet culpas suas omnium novissimi. Certe viri potestatibus sublimes, ipsi sibi ignoti sunt; et dum negotiis distrahuntur, tempore carent, quo sanitati, aut corporis, aut animæ suæ, consulant:

> "Illi mors gravis incubat,
> Qui, notus nimis omnibus,
> Ignotus moritur sibi."

In potestatibus, licentia magna datur, et boni, et mali: quorum posterius pro maledictione habendum: in malis enim, optima conditio est, nolle; proxima, non posse. Certe potentia bene-merendi verus est et legitimus ambitionis finis. Etenim bene cogitare, licet Deo acceptum sit, tamen versus homines non multo melius est, quam bene somniare, nisi in actum producatur. Id autem fieri non potest, sine munere aliquo publico et potestate; veluti solo superiore et elevato. Merita et opera bona sunt veri fines laborum hominis; atque eorundem conscientia perfectio humanæ quietis. "Et conversus Deus, ut aspiceret opera, quæ fecerunt manus suæ, vidit quod omnia essent bona nimis:" tum sequitur sabbatum. In munere tuo perfungendo, propone tibi exempla optima; imitatio enim globus est præceptorum: et post tempus aliquod propone tibi exemplum proprium; atque in teipsum stricte inquiras, num non melius inceperis, quam perstiteris: neque rursus exempla eorum negligas, qui eodem munere praviter functi sunt; non ut teipsum, eorum memoriam carpendo, vendites; sed ut monearis, quid evitare debeas. Institue igitur reformationem, sed absque elatione tui-ipsius, aut scandalo priorum temporum et personarum; hoc tamen tibi constitutum sit, exempla præclara non minus introducere, quam imitari. Retrahe res ad primam earum institutionem; et circumspicias, in quibus, et quibus modis, degeneraverint. Attamen utrunque tempus consulas; tum antiquius, ut cognoscas quid optimum fuerit; tum recentius, ut notes, quid fuerit aptissimum. Contende, ut quæ agis pro potestate, tanquam regulis quibusdam cohibeantur; ut hominibus tanquam digito monstres, quid illis sit expectandum: neque tamen nimium sis pertinax, aut peremptorius: atque semper cum a regula recesseris, quid

sit quod agas, diligenter expone. Muneris tui jura constanter tueare; neque propterea lites de jurisdictione facile move: atque ita te geras, ut potius jura tua assumas et exerceas tacite, et de facto, quam ut quæstiones de iis cum strepitu suscites et agites. Jura etiam inferiorum munerum, tibi subordinatorum, defende, ac ne destitue. Tibique majori honori ducas rerum summas præscribere, quam in omnibus satagere. Amplectere, imo invita, qui tibi adjumento sint et informationi, ad muneris tui executionem; neque abige eos, qui operam suam ad hoc tibi deferunt, tanquam se ingerentes; sed potius cum favore eos allicias, et recipias.

Vitia in auctoritate utenda, et exercenda, sunt præcipue quatuor. Mora nimia, corruptela, asperitas, et facilitas. Quantum ad moras, faciles aditus præbe; tempora præstituta serva; inchoata quæ sunt perfice; neque negotia nova intermisce, nisi urgeat necessitas. Quantum ad corruptelas: non solum manus tui ipsius, et tuorum liga, ne munera accipiantur; sed etiam manus supplicantium, ne ea offerantur. Prius horum præstat certe integritas adhibita; verum ea ipsa prædicata, et ex professo, idque cum detestatione corruptelarum, etiam posterius assequitur. Neque tantum culpam, verum etiam suspicionem devita. Quicunque mutabiles sunt, et manifesto alterantur absque causa manifesta, injiciunt suspicionem de corruptelis. Itaque perpetuo, cum ab opinione tua quam declarasti, aut processu quem incepisti, deflectas, ingenue hoc ipsum profitere; simul et causas quæ te ad hoc commoverunt sedulo declares et inculces; neque rem suffurari te posse credas. Servus gratiosus, et apud dominum potens, si non extet aliqua favoris causa manifesta, reputatur plerunque nihil aliud quam via obliqua ad corruptelas. Quantum ad asperitatem; invidiam, et malevolentiam parit illa, nihil inde metens: severitas siquidem metum incutit, asperitas odium parit. Etiam reprehensiones de loco superiore, graves esse debent, non contumeliosæ. Quantum ad facilitatem: ea corruptelis etiam deterior est: corruptelæ enim interdum et subinde tentantur; quod si quis importunitati pateat, aut respectibus levioribus ducatur, hæc ei ubique aderint. Sicut ait Solomon: "Personas respicere non est bonum; talis enim offendet pro buccella panis."

Verissimum sane, quod a veteribus dictum est: "Magistratus virum indicat." Alios autem indicat in melius, alios in pejus: "Omnium consensu capax imperii, nisi

imperasset:" inquit Tacitus de Galba, contra de Vespasiano idem; "Solus imperantium Vespasianus mutatus in melius." Licet alterum intelligat Tacitus de arte imperatoria, alterum de moribus et affectibus. Signum est luculentissimum indolis generosæ, si quis honoribus emendetur. Est enim honor, aut saltem esse debet, locus virtutis: atque quemadmodum in natura, corpora moventur rapide ad locum, placide in loco: ita virtus in ambitu violentior est, in honore adepto sedatior. Ascensus omnis ad dignitatum fastigium, incedit tanquam per scalam graduum flexuosam; atque, si factiones valeant, bonum fuerit, alteri parte adhærere, dum quis honorem scandat: at se ad æquilibrium reducere, postquam eundem fuerit consecutus. Memoriam prædecessoris tui illæsam conserva. Hoc si non feceris, debitum tibi hoc a successore tuo rependetur. Collegas etiam amice tracta, et potius advoca cum illud minime expectent, quam exclude cum consentaneum fuerit eos advocari. Ne sis loci tui nimis memor, aut crebram de eo mentionem facias, in quotidianis sermonibus, aut conversatione privata; sed potius prædicetur de te: "Alius prorsus vir est, cum sedet, et munus suum exercet."

XII. DE AUDACIA.

In scholis tritum est dicterium, nec tamen sapientis observatione indignum. Interrogatus olim Demosthenes, quænam prima oratoris virtus? respondit, Actio. Quæ secunda? Actio. Quæ tertia? itidem respondit, Actio. Ipse dixit, qui rem optime noverat; nec tamen in eo, quod laudabat, multum naturæ debebat. Mira certe res, illam oratoris partem, quæ non ultra corticem penetrat; et histrionis potius virtus censenda est, quam oratoris; in locum tam sublimem, supra nobiliores illas partes, inventionis, elocutionis, et cæterarum, extolli; imo quasi omne tulisset punctum, pene solam prædicari. Sed in promptu ratio est: inest enim naturæ humanæ, plerunque, plus stulti, quam sapientis. Unde et facultates eæ, quibus capitur pars illa in animis mortalium stulta, sunt omnium potentissimæ. Huic mire convenit, et quasi parallela est, audacia in negotiis civilibus. Quid in istis primum? Audacia. Quid secundum? Quid tertium? Audacia. Attamen utcunque ignorantiæ, et sordidi ingenii, proles est audacia; cæterisque civilis scientiæ partibus longe

impar. Sed nihilominus fascinat, et captivos ducit eos, qui vel judicio infirmi sunt, vel animo timidiores: tales autem sunt hominum pars maxima. Quin et sapientibus ipsis, cum animis vacillent, vim injicit. Idcirco videmus audacium, in democratiis, plurimum valuisse; apud senatores vero, et principes, certe minus. Imo quando primo rebus gerendis admoventur audaces; plus possunt, quam postea: nam male pollicita præstat audacia. Sane quemadmodum interveniunt agyrtæ, qui corpori naturali mederi profitentur; sic et corpori politico non desunt homines, qui curiationes vel difficillimas suscipient; quibus forsan in paucis aliquibus experimentis feliciter successit; sed cum scientiæ principia non gustarint, sæpius excidunt. Imo videre est nonnunquam hominem audacem, miraculum illud Mahometis edentem. Populo persuasit Mahometes, se collem ad semet evocaturum; atque a summo ejus jugo, preces pro legis suæ cultoribus, oblaturum. Populus magna frequentia convenit: collem, ut ad se veniret, iterumque iterumque vocavit Mahometes; sed cum collis immotus maneret, ille, (nihil omnino pudefactus,) inquit: "Si collis ad Mahometem accedere nolit, ad collem ibit Mahometes." Sic et istiusmodi homines, quando ingentia quædam in se susceperunt, turpissimeque in iis defecerunt, tamen (si ad ipsum audaciæ culmen pervenerunt,) lusu rem excipient, et se vertent, et nihil aliud. Hominibus profecto magno judicio præditis, ludibrio sunt audaces; imo et apud ipsum vulgus audacia aliquid habet ridiculi. Nam si risus objectum sit absurditas, ne dubites, quin magna audacia semper secum habeat aliquid ridiculi. Neque fere jucundius est spectaculum, quam videre in audace oris confusionem; vultum enim tunc nanciscitur in se reductum, sed deformiter. Nec aliter fieri potest. Nam in verecundantibus fluunt paulatim, refluuntque spiritus; sed audaces, quando tale quidpiam illis contingit, attoniti hærent; ut fit in schacciæ ludo, quando non vincitur collusor, sed torpet tantum motus. Atqui hoc postremum, satiræ aptius, quam seriæ observationi. Illud vero animadvertendum, audaciam semper cæcam esse. Discrimina enim et obstacula nulla videt: quare in deliberando nocet, in exequendo juvat. Adeo ut, si audaces tuto adhibere velis, summum illis imperium non deferas; secundæ classi annumerentur, et ab aliis regantur. Nam in consiliis capiendis, pericula ante oculos habere bonum est; in executione autem, oculos claudere oportet, nisi pericula valde magna fuerint.

XIII. DE BONITATE, ET BONITATE NATIVA.

Bonitatem eo sensu accipio, ut sit affectus, qui hominum commoda studeat, et bene velit: quam eandem Græci philanthropiam vocant. Humanitatis autem vocabulum, (prout vulgus ea utitur) levius aliquanto est, atque angustius, quam ut vim ejus exprimat. Bonitatem scilicet appello affectum, et habitum; bonitatem autem nativam, inclinationem. Bonitas vero inter omnes virtutes, atque animi dignitates, facile primas obtinet; cum sit ipsius divinæ naturæ adumbrata quædam effigies, et character: qua e rebus sublata, homo animalis nihil aliud fuerit, quam res inquieta, scelesta, misera, imo species quædam noxiorum vermium. Bonitas moralis, virtuti illi theologicæ, charitati, respondet; neque excessum quidem capit, aberrationem autem patitur. Immodica potentiæ cupiditas angelos cœlo deturbavit; immodica scientiæ cupiditas hominem paradiso expulit: at in charitate non datur excessus, neque per eam aut angelus, aut homo, unquam periculum subire possit. Inclinatio autem ad bonitatem, altis defixa radicibus, naturæ humanæ insidet: quæ si benefaciendi materia, aut occasione, destituta, non inveniat, quo se exerceat in homines, deflectet certe in brutas animantes. Quod in Turcis, gente utique sæva et fera, videre est; qui nihilominus erga bruta animalia misericordes sunt, et eleemosynas canibus et avibus distribuunt. Adeo ut, (referente Busbequio,) aurifex quidam Venetus, Byzantii agens, vix furorem populi effugerit, quod avis cujusdam, rostri oblongi, fauces, inserto baculo, diduxisset. Neque tamen erroribus suis vacat bonitatis hæc, et charitatis, virtus. Nequam apud Italos jactatur proverbium: "Tanto buon, cheval niente." Adeo bonus, ut ad nihil bonus. Neque subveritus est Nicolaus Macciavellus, literis concredere, idque disertis fere verbis: "Fidem Christianam, homines probos et innocentes, in prædam tyrannorum iniquitati dedisse." Quod ideo pronunciavit, quia nulla usquam lex, nulla secta aut opinio, tam in immensum extulit bonitatem, quam religio Christiana. Quo melius itaque, extra scandali, adeoque periculi ictum et minas, tuti consistamus, operæ pretium erit nosse errores, qui nos a recto tam insignis habitus tramite, transversos agant. Ita aliorum bono studeas, ne te illorum interea; aut vultibus, aut voluntatibus, mancipio dedas. Illud enim facilitatis, atque mollitiei indicium est, quæ honestam mentem

in vincula captivam abducit. Neque projicias Æsopi gallo gemmam, cui gratius et felicius cederet granum hordei. Dei exemplum, in hac re, pro præcepto tibi sit. "Ille pluvia sua rigat, sole suo irradiat, justos juxta ac injustos:" non tamen omnes ex æquo, aut opum imbre compluit, aut honorum, virtutumve splendore, illustrat. Communia quidem beneficia cuivis sunt communicanda: peculiaria vero paucis, et cum delectu. Cave autem, ne dum effigiem sculpas, archetypum destruas. Theologia quippe, amorem nostri ipsius pro archetypo statuit, amorem proximi pro imitamento. "Vende omne quod habes, atque elargire pauperibus, et sequere me." At noli omne, quod habes, vendere, nisi venias, et sequaris me: hoc est, nisi ejusmodi vitæ institutum ingrediaris, in quo, æque ex parvis opibus, ac ex magnis, poteris aliis benefacere. Secus, dum rivos alis, fontem exhauris. Neque interea habitus tantum bonitatis reperitur ad rectæ rationis normam applicatus, sed etiam in quibusdam hominibus reperitur indoles naturalis ad eam propensa: uti e contra in aliis naturalis quædam malignitas. Sunt enim, qui ex ingenii proprii instinctu aversentur aliorum bonum. Et levius quidem malignitatis genus, in morositatem cedit, aut perversitatem, aut præcipitem opponendi, et se in singulis difficilem præbendi, libidinem, et similia: gravius tamen illud, atque altius, ad invidiam producitur, meramque malitiam. Hujusmodi homines in alienis calamitatibus fere florent, easque semper aggravant: non digni certe, qui conferantur canibus illis, qui Lazari delingebant ulcera; sed muscis, quæ cruda quæque et excoriata infestant. Non paucos reperias misanthropos, quibus volupe est deducere homines ad suspendii ramum, neque tamen arborem habent in hortis suis, qualem Timon habuit. Ingenia ita disposita, non injuria vocare licet, humanæ naturæ vomicas, et carcinomata. Sunt tamen hæc ligna accommodatissima, e quibus fiant Mercurii politici: similia lignis incurvis, quæ bene navigiis exstruendis conveniunt, jactationi destinatis, non autem ædibus, quæ immotæ manent. Partes autem, et indicia bonitatis sunt plurima. Si quis se erga hospites et peregrinos benignum humanumque præbeat, arguit se mundi civem, sibique cor esse, non instar insulæ, cæteris terris avulsæ, sed continentis, quæ illis conjungitur: si compatiatur afflictis, nobilitat sua præcordia, quæ non secus atque celebrata illa arbor, per sua vulnera, balsamum exsudat. Si facilis offensas remiserit, et delictorum gratiam fecerit, mentem indicat in alto positam esse, supra

injuriarum jactum et tela. Si pro modicis beneficiis gratum se exhibeat, argumento est, pluris se æstimare hominum animos, quam sarcinas. Supra omnia, si supremum illum, sancti Pauli apostoli, perfectionis fastigium sit consecutus, ut devoveat se, atque anathematizet a Christo, propter salutem fratrum, indicio est, proxime illum accedere ad naturam divinam, et quodammodo Christo ipsi conformari.

XIV. DE NOBILITATE.

De nobilitate primum agamus, ut est portio reipublicæ; deinde ut est conditio hominum particularium. Monarchia, in qua nulli prorsus nobiles, semper pura est et absoluta tyrannis: cujusmodi est imperium Turcicum. Dignitatem enim regalem diluit nobilitas, et vulgi oculos a prosapia regia aliquantulum avocat. In democratia vero, proceres interdum non desiderantur: imo status ille popularis multo pacatior est, atque minus factionibus et turbis obnoxius, ubi non sunt stirpes nobilium: illic enim in res ipsas oculi hominum conjiciuntur, non in personas; vel si omnino in personas, id fit, tanquam in maxime idoneas rebus gerendis, minime vero ut ratio habeatur insignium, aut imaginum. Helvetiorum rempublicam satis florentem videmus, licet religionis pagorumque diversitas obstare videatur. Utilitas enim apud illos valet, non dignitas. Illa gubernandi forma, qua confederatæ Belgarum provinciæ utuntur, certe eminet: ubi enim paritas admittitur, ibi et consilia ineuntur æquabilius, et tributa penduntur alacrius. Nobilium potentia et auctoritas in monarchia, principi ipsi impertit splendorem, sed potestatem imminuit; populi vero animos auget, fortunas illorum deprimit. Bene se res habet, cum nobiles non sint potentiores, quam aut imperii aut justitiæ ratio postulat: in eo tamen dignitatis gradu sustineantur, ut insolentia popularis illorum reverentia, tanquam obice, retundatur, antequam in regalem majestatem se effundat. Rursus, numerosa nobilitas, quæ plerumque minus potens est, statum prorsus depauperat: hinc enim profusæ expensæ: atque insuper, cum necesse sit, tractu temporis, complures ex nobilibus indigos fieri, sequitur divortium quoddam, sive malum temperamentum, inter honores et pecunias.

Quod vero ad nobilitatem spectat in personis particularibus: venerationem certe habet, videre castellum, aut

ædificium antiquum, quod nulla ruina invasit: aut etiam annosam et proceram arborem solidam et integram: quanto magis intueri antiquam nobilem prosapiam, a fluctibus et procellis temporis, illæsam. Nobilitas enim nova regiæ potentiæ opus est, antiqua vero temporis solius. Qui ad nobilitatis fastigium primi evehuntur, virtutum claritudine plerumque posteris eminent, sed innocentia minime. Ad honores enim raro ascenditur, nisi per mixturam bonarum et malarum artium. Æquum vero est, ut virtutum suarum memoria, usque ad posteros permanet; vitiorum vero una cum ipsis moriatur. Natalium splendor industriam plerunque minuit; atque qui minus est industrius, alienæ invidet diligentiæ. Ad quod accedit, quod non datur, quo possint ulterius nobiles promoveri. Qui vero in eodem loco hæret, dum alii ascendunt, invidiæ stimulis vix carebit. Contra, nobilitas passivam invidiam omnino lenit; eo quod nobiles in honorum possessione nati videntur. Sane reges, quibus nobiles adsunt prudentes et capaces, negotia sua mollius fluere sentient, si eos potissimum adhibeant: etenim, erga hujusmodi proceres populus magis propendet, utpote natos quodammodo ad imperandum.

XV. DE SEDITIONIBUS ET TURBIS.

MAGNI refert, ut pastores populi prognostica tempestatum politicarum sciant; quæ tunc maxime sunt, cum res vergunt ad æqualitatem; non secus ac naturales tempestates circa æquinoctia invalescunt. Quemadmodum autem, sæpe videre est flatus ventorum, cavos, et veluti a longinquo; quin et similiter maris tumores occultos, ante procellam; idem evenit ingruentibus procellis politicis.

> " Ille etiam cæcos instare tumultus
> Sæpe monet, fraudesque, et operta tumescere bella."

Famosi libelli, et licentiosi et mordaces sermones in status scandalum, cum passim volitant, et increbrescunt: similiter novarum rerum rumores mendaces, in regiminis dedecus, undique jactati, et avide a populo excepti; sunt certe inter prognostica seditionum. Quo stemmate deducta sit Fama cum Virgilius depingeret, gigantum sororem eam esse ponit.

> " Illam Terra parens, ira irritata Deorum,
> Extremam (ut perhibent) Cæo Enceladoque sororem
> Progenuit."

Quasi famæ fuissent seditionum præteritarum reliquiæ: verum sunt illæ non minus seditionum futurarum præcursatrices. Recte tamen utcunque notatum est, inter seditiosos tumultus, et seditiosos rumores, nil aliud fere interesse, nisi qualis est discrepantia, inter fratrem et sororem, masculum et fœminam. Præsertim si eo usque ingravescat malum, ut actiones status laudatissimæ, quæ merito plausum vulgi mererentur, et populi studia conciliare deberent, in deteriorem partem traducantur et sugillentur: hoc enim invidiæ molem grandem demonstrat; ut recte ait Tacitus: "Conflata magna invidia, seu bene seu male gesta premunt." Neque propterea sequitur, quod quia famæ istæ inter turbarum signa numerentur, ideo earum suppressio severior remedium contra turbas præstare intelligeretur; nam ut plurimum contemptæ facilius evanescunt, et conatus sedulus eas coërcendi nihil aliud fere efficit, quam ut durent magis.

Item illud genus obsequii in exsequendis jussis, de quo loquitor Tacitus, pro suspecto habendum: "Erant in officio, sed tamen qui mallent imperantium mandata interpretari, quam exequi." Mandata discutere, detractare, cavillationibus eluere, quid aliud sunt, quam jugum jactare, et inobedientiam tentare? presertim ubi in istis disputationibus circa mandata, qui a parte mandatorum stant, loquuntur timide et molliuscule; qui autem adversantur, audacius et contumacius.

Etiam (ut bene notat Macciavellus) cum principes, qui se pro parentibus communibus gere deberent, factioni alicui se adjungunt, idem fit, ac cum lembus, inclinatione nimia in alterum latus, evertitur. Hoc temporibus Henrici tertii Gallorum regis, confirmatum est. Ipse enim, a principio, in ligam pro exstirpandis protestantibus se recipi voluit: at paulo post, eadem liga contra ipsum regem vertit. Cum enim auctoritas principis fit causæ cujuspiam tanquam accessoria, et fortior insurgit aliqua obligatio, quam vinculum imperii, reges incipiunt de possessione auctoritatis suæ dejici.

Porro cum discordiæ, et duella, et factiones, palam et audacter se ostentant, indicio est reverentiam erga principem exui. Motus enim procerum debent esse sicut motus planetarum, sub primo mobili, (juxta opinionem receptam) qui rapide quidem circumferuntur secundum motum primi mobilis, leniter autem renituntur in motu proprio. Quare si viri primores et nobiles propriis motibus violenter rapiantur, et (ut scite Tacitus) "Liberius, quam

ut imperantium meminissent;" orbes perturbari manifestum est. Reverentia enim id ipsum est, quo reges a Deo accinguntur, qui eam aliquando disrumpere minitatur: "Solvam cingula regum."

Rursus, cum aliqua ex quatuor imperii columnis, concutiatur aut labefactetur, (quæ sunt, religio, justitia, consilium, opes,) tum serenitas precibus imploranda est. Sed mittamus hæc prognostica seditionum, (circa quæ nihilominus intervenient nonnulla, quæ iis tractandis majorem lucem præbere possint, in sequentibus,) et primo de materia seditionum; postea de earum causis et flabellis; ultimo de remediis nonnihil dicamus.

Materiam seditionum expendere res est consideratione dignissima. Tutissima enim via seditiones evitandi, (si tempora patiantur,) est, ut ipsam materiam e medio tollamus. Si enim fomes flammæ paratus sit, scintillæ, quæ incendium facient, ex qua parte emicare possint, nemo facile dixerit. Seditionum materia duplex est: magna inopia, et præsentium rerum tædium. Certissimum est, tot esse pro turbis vota quot sunt hominum res attritæ, et decoctæ fortunæ. Unde illa Lucani observatio de statu imperii Romani, paulo ante bellum civile;

> "Hunc usura vorax, rapidumque in tempore fœnus:
> Hinc concussa fides, et multis utile bellum."

Hoc ipsum, "Multis utile bellum," certum est indicium status ad commotiones et turbas dispositi. Tum si primorum hominum indigentia, ac res accisæ, cum summa plebis inopia et paupertate conjungantur, periculum imminet grave. Rebelliones enim, quæ a ventre ortum habent, pessimæ. Quantum vero ad alienationes animorum, et tædium rerum præsentium; sunt certe illa, in corpore civili, instar humorum maligniorum in corpore naturali, qui ad calorem præternaturalem colligendum, et inflammationes, apti sunt. Nemo autem principum sui periculi magnitudinem metiatur ex eo, quod justa sint aut injusta illa, quæ animos populi alienant: hoc enim esset vulgus rationis nimium capax putare, qui suo sæpe recalcitrant commodo. Neque etiam ex hoc, quod gravamina, ex quibus invidia oritur, grandia sint aut exigua. Malevolentiæ enim ex omnibus istæ periculosissimæ sunt, ubi plus timetur, quam sentitur. "Dolendi modus, timendi non item." Preterea, in maximis oppressionibus, ea, quæ patientiam irritant, etiam animos frangunt: at in timoribus dispar est ratio. Neque rursus princeps, aut

status, alienationem animorum, et invidiam grassantem minus pendat, quod aut sæpius aut diutius, illa fastidia animorum æstuarunt, neque quicquam inde detrimenti respublica cepit. Verum enim licet sit, quod non omnis vapor in procellam desinat; ita vere dici potest, ex altera parte, quod procellæ, licet sæpius pertranseant, tandem glomerantur et ruunt. Atque, secundum adagium illud Hispanicum, "funiculus in fine, levissima tensione rumpitur."

Causæ seditionum hæ sunt: in rebus religionis innovatio; tributa et census; legum et consuetudinum mutatio; immunitatum et privilegiorum violatio; oppressio universalis; indignorum ad honores et magistratus promotio; alienigenæ; caritas annonæ; milites incuriose dimissi; factiones factæ desperatæ; quicquid denique populum offendit, simulque eos in causa communi unit, et conspirare facit.

Quantum ad remedia. Præservativa quædam confuse, et in genere, possunt assignari, de quibus disseremus; curatio autem legitima morbo particulari aptari debet. Itaque consiliis potius, quam præcepto, relinquenda.

Primum contra seditiones remedium, et præventio, hæc est; omni cum opera et diligentia causam illam seditionum materialem, de qua diximus, amovere; paupertatem intelligo civium, et inopiam. Cui inseruit commercii rationes bene liberare, et bene librare; artifices et manufacturas introducere, et fovere; desidiam et otium profligare; luxum et profusionem sumptuariis legibus coërcere; solum et agros cultura lucrosissima subigere; rebus venalibus pretia justa imponere; census et tributa moderari; et similia. In genere præcavendum, ut incolarum multitudo (temporibus scilicet Pacis, quando gladius nihil demetit,) regni proventus, quibus ali possit non excedat. Neque incolarum multitudo, utrum superflua sit, nec ne, capitum numero solum censenda est. Sunto enim pauciores, qui multum profundunt, et parum lucrantur, plus illi atterent statum, quam multo plures, qui majore parsimonia degunt, pecunias autem congerunt. Nobilium igitur, et eminentioris dignitatis hominum, numerus auctus, magis quam pro analogia plebeiorum, celeriter statum depauperat. Quod etiam facit clerus numerosus: illi enim sorti reipublicæ nihil adunt. Idem quoque fit, cum plures in literis educantur, quam quibus victum suppeditare possint vocationes civiles.

Neque præteruendum est, quod cum omne publicæ opulentiæ augmentum, ab exteris nationibus lucrifieri necesse

sit; (quicquid enim alicubi adjicitur, alibi detrahitur;) tria tantum esse, quæ gens genti vendit; materiam mercium; manufacturam; et vecturam. Quæ quidem tres rotæ, si recte progrediantur, æstus divitiarum erunt uberiores. Sæpius autem contingit illud, de quo loquitur poëta, "Materiam superabit opus;" nempe ut manufactura, et vectura, materiæ pretium excedat, et statum magis locupletet. Manifesit sunt hujus Rei testes inferioris Germaniæ populus; qui quidem fodinas, non subterraneas illas, sed supra terram præ omnibus gentibus habent ditissimas.

Nihil autem prius debet esse aut consultius quam ut videat magistratuum prudentia, ne pecuniarium thesauri apud paucos recondantur. Aliter enim facile fuerit, rempublicam inter magnas opes fame perire. Nummus autem instar fimi, non fructificat, nisi per terram dispergatur. Hoc præcipue efficitur, supprimendo, aut saltem coërcendo, voragines illas, fœnoris, monopoliorum, et latifundiorum in pascua conversorum, et similium.

Quantum ad sedandas animorum offensiones, aut saltem ad amolienda ea, quæ ab iis proveniunt, pericula; duo sunt, in omni statu, (ut notum est,) subditorum genera; proceres et plebs. Quævis harum partium sola, si infensa sit, non magnum subest periculum. Tardi enim sunt populi motus, nisi a nobilibus incitentur: nobiles autem invalidi, nisi vulgus, sua sponte, ad motus aptum et prædispositum sit: tum periculum revera ingruit, cum potentiores expectent, dum aquæ moveantur apud vulgus, ut ita demum animos exulceratos prodere possint. Fingunt poëtæ, cœlicolas Jovem ut vincirent conjurasse; quod ubi Jupiter accepisset, Minervæ consilio, Briareum centimanum accersivit, ut in suppetias et veniret. Proculdubio hoc emblema monarchas monet, quam tutum et salutare sit eis, plebis studia conciliare et retinere.

Licentiam nonnullam, sed moderatam, animis gravate affectis et malevolis indulgere, ut ebulliant eorum dolores, et in fumos abeant, (modo insolentia absit, et audacia,) utile sane est. Qui enim humores, ad interiores partes retrovertit, et vulnus in viscera sanguinem refundere compellit, ulcera mortifera, et exitiala apostemata, inducit.

Ad molliendos exacerbatos et malevolos animos, partes Epimethei etiam ad Prometheum rite transferri possint. Neque enim reperitur remedium utilius. Epimetheus, ubi mala et ærumnas evolare sensisset, operculum vasi festinus imposuit, et in imo dolii spem reservavit. Certe, politice

et artificiose spem nutrire, et injicere, ac homines a spe alia in aliam circumducere, ex fortissimis est, contra venenum malevolentiæ, antidotis. Neque certius est indicium prudentis regiminis, et rerum administrationis, quam ubi homines spe continere possit, cum satisfaciendi copia non datur; atque ubi res tam provide tractantur, ut nullum malum ita peremptorie imminere videatur, quin aliqua se ostendant spei rima ad evadendum: quod eo minus difficile factu est, quia tam privatis hominibus, quam factionibus, sibi ipsis adulari insitum est; aut saltem, ostentare, in gloriam suam, quod non omnino credunt.

Trita sane est, sed præcellens periculorum, quæ malevolentiæ minantur, cautio, ut prævideatur, ne sit caput aliquod, ad quod populus infensus et exacerbatus confluere, et sub cujus præsidio in corpus aliquod coire, possit. Caput ego illum dico, et ducem idoneum, qui nobilitate et existimatione celebratur; quique apud malevolos acceptus est et gratiosus, atque ad quem ora et oculos convertunt; quique etiam ipse in rebus suis privatis censetur offensus. Quod genus virorum, aut statui conciliandum est, idque non perfunctorie, sed solide; aut per alium aliquem, ex iisdem partibus retundendum; qui illi alteri se opponat, atque gratiam popularem, in diversa trahat et secet.

Ubique hoc obtinet, quod factiosas potentias et coitiones, quæ contra gubernationem imperii frontem contrahunt, inter se committere, aut saltem diffidentiam inter eas seminare, remedium haud contemnendum sit. Etenim male admodum agitur cum republica si illi, qui erga imperium bene affecti sunt, discordiarum pleni existant; qui vero infensi, et maligni, arcte conjungantur.

Adnotavi sæpius ingeniosa et arguta dicteria, quæ principibus improviso exciderunt, nonnunquam scintillas ad seditiones injecisse. Exitiale sibi vulnus inflixit Cæsar, eo dicto; "Sylla nescivit literas, dictare non potuit." Spem enim omnem illud verbulum præscidit, quam homines imbiberant, aliquando eum dictaturam depositurum. Perdidit seipsum Galba eo dicto; "Legi a se militem, non emi." Inde enim milites de donativis desperarunt. Probus item propter eam vocem interiit, "Si vixero, non opus erit amplius, Romano imperio militibus." Etenim ob hæc verba milites animum desponderunt. Sunt et alia haud pauca ejusdem generis. Interest sane principibus, in rebus ambiguis, et temporibus anxiis, ut caveant quid dicant; præsertim in concisis his sententiis, quæ veluti spicula volitant, et ex secreto pectoris eorum emissa putantur.

Longiores enim et productiores sermones obtusi sunt, et minus notantur.

Postremo, in omnes eventus, habeant circa se principes, personas nonnullas militia et fortitudine spectatas, ad reprimendas seditiones, in primis motibus. Hoc enim si desit, magis trepidari solet, in aulis principum, cum turbæ primo erumpunt, quam par esset. Et status eo genere periculi laborat, quod Tacitus illis verbis innuit; "Atque is habitus animorum fuit, ut pessimum facinus auderent pauci, plures vellent, omnes paterentur." Isti autem militares viri, fidi omnino esse debent, et bonæ existimationis, potius quam factiosi, aut populares; et cum cæteris proceribus bene comparati. Aliter remedium morbo gravius.

XVI. DE ATHEISMO.

Minus durum est, credere portentosissimis fabulis Alcorani, Talmudi, aut Legendæ, quam credere, huic universitatis rerum fabricæ, mentem non adesse. Itaque Deus nunquam edidit miraculum, ad atheismum convincendum, quoniam opera ejus ordinaria, huic rei sufficiunt. Verum est tamen, parum philosophiæ naturalis, homines inclinare in atheismum; at altiorem scientiam, eos ad religionem circumagere. Etenim intellectus humanus, dum causas secundas intuetur sparsas, interdum iis acquiescere possit, nec ulterius penetrare; verum cum tandem catenam earum, connexarum inter se, et confœderatarum, contemplari pergat, necesse habet confugere ad providentiam et deitatem. Imo, et illa schola, quæ præcipue accusatur atheismi, si quis vere rem introspiciat, religionem demonstrat clarissime: nempe schola Leucippi, Democriti, et Epicuri. Etenim longe verisimilius est, quatuor elementa mutabilia, et unam quintam essentiam immutabilem, recte ab æterno locata, opus Deo non habere; quam exercitum atomorum et seminum infinitorum, sine ordine fortuito vagantium, hunc rerum ordinem, et pulchritudinem, progignere potuisse, absque ædili quodam divino. Dicit Scriptura, "Dixit insipiens in corde suo, non est Deus:" non dicit, "Cogitavit insipiens in corde suo:" adeo ut, magis intra se hoc asserat, tanquam rem quam lubens optaret, quam quod penitus hoc credat, et sentiat. Nemo enim Deos non esse credit, nisi cui Deos non esse expedit. Nulla alia re sane magis convincitur Atheismum labiis tantum insidere, cordi autem minime, quam hac, quod

athei opinionem suam sæpe prædicent et defendant, ac si ipsi sibi diffiderent, aliorumque consensu refocillari cuperent. Quinetiam, videas interdum Atheos sibi discipulos comparare, ut aliæ sectæ faciunt; imo, quod monstri simile est, quidam ex illis mortem et cruciatus subierunt, potius quam opinionem suam retractare sustinerent: cum tamen, si ex animo sentirent, nihil tale esse quale Deus, quid tandem de ea re satagerent? Epicuro imponitur; eum existimationis suæ conservandæ gratia, tenuisse, quod existerent quidem beatæ quædam naturæ, sed quæ seipsis fruerentur; neque mundi administrationi se immiscerent. In qua opinione, aiunt eum, tempori obsecutum, cum revera Deos esse non putaret. Verum, ut videtur, minus juste arguitur: verba enim ejus egregia sunt et divina; "Non deos vulgi negare profanum, sed vulgi opiniones diis applicare profanum." Plato ipse melius dicere non potuit. Unde videtur, licet audacia polleret ad divinam rerum administrationem pernegandam, eam tamen ad naturam eorum tollendam illi non suffecisse. Indi occidentales, particularium Deorum suorum nomina prædicant; etsi nomen nullum generale habeant, quod Deum significet: exempli gratia, perinde ac ethnici nomina Jovis, Apollinis, Martis, etc. in usu habuissent, voce autem, qua Deum exprimerent, caruissent. Quod satis indicio est, populos maxime barbaros notionem rei habere, licet latitudinem ejus non comprehendant. Adeo ut contra atheistas, homines maxime ferini, cum philosophorum subtilissimis, militent. Atheista contemplativus, raro reperitur; Diagoras, quis, Bion, et fortasse Lucianus, atque alii pauci; qui tamen plures esse videntur quam sunt; quoniam omnibus, qui religionem aliquam, aut superstitionem impugnant, a secta adversa, solet inuri nomen et nota atheistarum. Sed magni revera atheistæ sunt hypocritæ; qui sacra perpetuo tractant, sed sine sensu. Adeo ut eos in fine cauterizatos evadere, necesse sit. Causæ atheismi sunt: divisiones circa religionem, si plures fuerint; nam unica divisio, zelum utriusque partis adauget, verum numerosæ Atheismum introducunt. Alia causa sunt, scandala sacerdotum; cum eo res redeat, quo innuit S. Bernardus: "Non est jam dicere, ut populos, sic sacerdos; quia nec sic populos, ut sacerdos." Tertia est, consuetudo profana ludendi et jocandi in rebus sanctis, quæ sensim reverentiam religionis atterit. Postremo ponuntur secula erudita, præsertim cum pace, et rebus prosperis conjuncta. Etenim, calamitates, et adversa, animos hominum, ad religionem fortius flectunt.

Qui Deos negant, nobilitatem generis humani destruunt. Nam certissimum est, hominem brutis cognatum esse, quatenus ad corpus: quod si, quatenus ad animam, non intercedat ei cognatio cum Deo, vilis est plane, et ignobilis creatura. Destruunt quoque magnanimitatem, et humanæ naturæ exaltationem. Cape enim exemplum a cane, et observa, quantos sibi assumat animal illud spiritus, et quantam generositatem induat, cum se ab homine, (qui ei vice est Dei, aut melioris naturæ) impulsum perspiciat. Quam fortitudinem liquido cernas tantam esse, quantam creatura illa, absque fiducia melioris naturæ, quam propriæ, æquare nullo modo possit. Similiter et homo, ubi innititur, et spem collocat, in divina providentia et gratia, fiduciam et vires colligit, quales humana natura, sibi relicta nequiisset attingere. Quare, ut atheismus, in omnibus odium meretur, ita et in hoc, quod privet naturam humanam facultate, se ultra fragilitatem humanam attollendi. Quemadmodum fit, in personis individuis, similiter fit et in nationibus. Magnanimitatem Romanam, nunquam gens aliqua æquavit. Audi igitur, quid dicat Cicero. "Quam volumus, licet, patres conscripti, nos amemus, tamen nec numero Hispanos, nec robore Gallos, nec calliditate Pænos, nec artibus Græcos, nec denique hoc ipso hujus gentis et terræ domestico nativoque sensu Italos ipsos, et Latinos: sed pietate, ac religione, atque hac una sapientia, quod Deorum immortalium numine omnia regi, gubernarique perspeximus, omnes gentes, nationesque superavimus."

XVII. DE SUPERSTITIONE.

Præstat, nullam aut incertam, de Deo habere opinionem, quam contumeliosam, et Deo indignam: alterum enim infidelitatis est, alterum impietatis et opprobrii. Ac superstitio certe divinitatis est dedecus. Plutarchus, non abs re, inquit; "Mallem sane multo, ut homines dicerent, nunquam fuisse talem in rerum natura virum, qualis ferebatur Plutarchus; quam ut dicerent, fuisse quendam Plutarchum, qui liberos suos, recens natos, comedere et devorare solitus erat; quod poëtæ de Saturno memorant." Quemadmodum autem contumelia superstitionis ingravescit adversus Deum; ita et periculum majus ab illa incumbit hominibus. Atheismus non prorsus convellit dictamina sensus, non philosophiam, affectus naturales, leges, bonæ

famæ desiderium; quæ omnia, licet religio abesset, morali cuidam virtuti externæ conducere possunt: at superstitio hæc omnia dijicit, et tyrannidem absolutam, in animis hominum exercet. Itaque atheismus, turbas in rebuspublicis raro ciet: homines enim cautos reddit, et securitati suæ consulentes. Quin et videmus tempora ipsa, in atheismum procliviora, (qualia fuerunt Augusti Cæsaris,) tranquilla fuisse. At superstitio, compluribus regnis et rebuspublicis, ruinæ fuit: introducit enim novum primum mobile, quod omnes imperii sphæras rapit. Magister superstitionis populus; atque in omni superstitione, sapientes stultis obsequuntur; atque argumenta practicæ succumbunt, ordine perverso. Gravis fuit ille sermo, quorundam prælatorum in concilio Tridentino, in quo doctrina theologorum scholasticorum, plurimum potuit; nimirum; " Scholasticos astronomis similes fuisse, qui eccentricos circulos, et epicyclos, et hujusmodi orbium machinas finxerunt, quo phænomena servarent, etsi satis scirent, nihil tale revera existere:" eodem modo, etiam scholasticos complura subtilia et perplexa axiomata et theoremata invenisse, quo practicæ ecclesiæ caverent. Superstitionis causæ sunt; grati et sensuales ritus ac ceremoniæ; externæ et pharisaicæ sanctitatis excessus; traditionum major quam par fuerit reverentia, quæ ecclesiam non potest non onerare; stratagemata prælatorum, quibus utuntur ad ambitionem propriam, et lucrum; nimius intentionum bonarum favor, qui novitatibus et ἐθελοθρησκείαις januam aperit; exemplorum importuna et inepta petitio ab humanis, quæ in divina transferantur, quæ necessario parit fantasiarum male cohærentium mixturam; postremo tempora barbara, cum calamitatibus et perturbationibus conjuncta. Superstitio, sine velo, deformis res est; etenim sicut simiæ, similitudo cum homine, deformitatem addit; ita et superstitioni, similitudo cum religione. Et quemadmodum, cibi salubres corrumpuntur in vermiculos; ita ritus et formulæ bonæ et sanæ, corrumpuntur in observantias pusillas et superfluas. Quin et, non caret superstitione, quandoque superstionis fuga; cum se tanto saniorem et puriorem viam inire putent homines, quanto a superstionibus, prius receptis, longius deflexerint. Itaque curæ esse debet, in religione reformanda, (ut fit in corpore purgando) ne sana cum corruptis simul evacuentur; quod fere fit, ubi reformatio regitur a populo.

XVIII. DE PEREGRINATIONE IN PARTES EXTERAS.

PEREGRINATIO in partes exteras, in junioribus, pars institutionis est; in senioribus, pars experientiæ. Qui proficiscitur in partes exteras antequam in lingua gentis, quam adit, aliquos fecerit progressus, ad ludum grammaticum vadit, non ad peregrinandum. Ut adolescentes peregrinentur sub tutore, aut servo aliquo experto probo; modo talis sit, qui linguam calleat, quique regionem illam ante adiverit; unde possit eos instruere; quæ in illa regione, ubi peregrinantur, digna spectatu et cognitu sint; quæ amicitiæ et familiaritates contrahendæ; quæ denique studia et disciplinæ ibi vigeant. Aliter enim adolescentes peregrinabuntur cucullati, et foras prospicient parum. Mirabile certe est, in navigationibus, ubi nihil aspici datur præter cœlum et pontum, conficere consuesse homines diaria; verum in peregrinationibus per terram, in quibus tot res occurrunt observandæ, plerunque hoc omitti; ac si fortuita magis in codicillos mererentur referri, quam quæ de industria observantur. Diaria igitur in usu sint. Res spectandæ et observandæ sunt istæ. Aulæ principum; præsertim cum legatos exteros admittunt: judicia et curiæ, cum causæ perorantur; et similiter consistoria ecclesiastica: templa et monasteria, cum monumentis in illis extantibus: mœnia et munitiones urbium et oppidorum: portus et sinus: antiquitates et ruinæ: bibliothecæ, collegia, disputationes, et prælectiones ubi habentur: naves et carinæ: palatia, et horti magnifici et amœni prope urbes magnas: armaria: navalia: cellæ et horrea publica: loci excambii: bursæ: cellæ mercium; exercitia equitationum, muneris gladiatorii, militum delectus et instructio, cum similibus: comœdiæ, illæ scilicet ad quas homines melioris notæ spectatum veniunt: thesauri monilium et vestium: curiositates et raritates: denique quicquid in locis, quæ transeunt, sit celebre aut memorabile. De his omnibus, a tutoribus, aut servis prædictis, diligenter inquirendum. Quantum ad triumphos, saltationes sub larva, convivia, nuptias, funera, supplicia capitalia, et hujusmodi spectacula, non opus est ut reducantur hominibus in memoriam; attamen non sunt certe illa prorsus negligenda. Si tibi cordi sit, fructum peregrinationis adolescentis in compendium redigere, utque brevi spatio multum colligat, hoc faciendum præcipio. Primo (ut dictum est) in lingua aliquis profectus faciendus antequam proficiscatur. Tum

adjungendus est, servus aliquis aut tutor, qui regionem pernorit, ut et jam dictum est. Habeat etiam præsto librum aliquem, aut chartam chorographicam, regionis illius, ubi peregrinatur; quæ instar clavis erit ad inquirendum. Conficiat etiam diarium. Ne moretur longius, in una urbe, aut oppido: plus certe aut minus, prout locus meretur, sed minime diu. Imo, dum moratur in aliqua civitate, aut oppido, mutet sæpius hospitium, ex una parte oppidi in alteram; nam et hoc certe magnes est attrahendi familiaritates, et consuetudines hominum complurium. Secludat se ut plurimum a consortio popularium suorum, atque in iis locis victitet, ubi simul convivantur homines melioris notæ, ex natione ubi peregrinatur. Etiam cum de loco in locum itineratur, paret sibi literas commendatorias, ad personam aliquam eminentiorem, degentem in loco quo se transfert; ut ejus favore et opera utatur, in iis, quæ spectare aut cognoscere desiderat. Hoc modo peregrinationis utilitatem accelerare poterit. Quatenus ad familiaritates et amicitias, quæ inter peregrinandum adjungendæ sunt; utilissima omnium est illa secretariorum, et ministrorum interiorum quibus legati utuntur: hoc enim pacto, in una regione peregrinando, etiam plurium regionum notitiam et experientiam, ad se attrahet, et suget. Visitet etiam et adeat personas in unoquoque genere egregias, quæ magni apud exteros nominis sunt; ut possit notare quomodo os, vultus, et corporis lineamenta et motus, respondeant famæ. Quantum ad rixas et simultates, cum cura et diligentia sunt illæ vitandæ. Oboriuntur sæpissime circa amores, compotationes, præsidentiam, et verba contumeliosa. Et caveat imprimis quivis a consortio hominum iracundorum, et qui facile inimicitias suscipiunt; illi enim eum suis immiscebunt contentionibus: quando peregrinator domum revertitur, nihilominus regiones, in quibus peregrinatus est, non relinquat prorsus pone se: verum conservet, et colat amicitiam eorum, cum quibus familiaritatem contraxit, (iis dico qui sunt ex dignioribus,) per literas. Et peregrinatio sua potius manifestetur et appareat in sermonibus suis, quam in vestitu, aut gestu: etiam in sermonibus suis, potius meditetur quid sobrie respondeat, quam ad narrationes facilis et pronus sit. Illud etiam in eo sit conspicuum, quod mores patrios cum moribus exteris, non commutaverit: sed potius quod consuetudines patrias, iis quæ peregre didicit, tanquam floribus, asperserit.

XIX. DE IMPERIO.

Miser procul dubio est animi status, pauca habere quæ appetas, multa quæ metuas: attamen hoc ipsum regibus fere proprium est: qui in supremo gradu collocati, non habent ad quod aspirent; id quod animos eorum reddit languidiores: atque e contra habent phantasmata plurima periculorum et umbrarum volitantium; id quod animos eorum reddit minus serenos. Hinc etiam emanat et alter ille effectus, quem Scriptura regibus tribuit; "ut cor regis sit inscrutabile:" etenim suspicionum multitudo, et absentia affectus alicujus prædominantis qui reliquis imperet, cujusvis animum reddit exploratu difficilem. Hinc quoque emanat et illud; quod reges sæpenumero desideria sibi ipsis creent, atque ad nugas animum adjiciant: interdum ad ædificia extruenda; interdum ad ordinem aliquem aut collegium instituendum; interdum ad personam aliquam evehendam; interdum ad artem aliquam mechanicam aut manus excellentiam exercendam; ut Nero studuit pulsandæ cytharæ, Domitianus sagittis collimandis, Commodus gladiatoriæ, Caracalla aurigationi. Hoc illis incredibile videtur, qui axioma illud non norunt: Animum humanum, magis exhilarari et refici, progrediendo in rebus parvis, quam consistendo in rebus grandibus. Videre etiam est reges, qui sub imperii sui initiis, in victoriis et provinciis subjugandis, maxime fœlices fuerunt; cum vix possibile sit ut perpetuos progressus faciant, verum ut fortunam suam aliquando adversam et retrogradam experiantur; sub fine superstitiosos et melancholicos evasisse: uti contigit Alexandro Magno, Dioclesiano, ac nostra ætate Carolo quinto; et aliis. Qui enim progredi semper consuevit, et in obicem tandem impingitur, sui ipsius favore excidit, neque amplius res est quæ fuit.

Dicamus nunc de vera imperii temperatura; quam servare, res ardua est, et rara. Etenim tam temperies, quam intemperies, ex contrariis consistunt. Verum alia res est, contraria miscere, alia alternare. Responsum Apollonii, egregia prudentia plenum est. Interrogabat eum Vespasianus; "Quid Neroni ruinæ fuisset?" Respondit; "Nero cytharam perite pulsare, et accommodare noverat; at in imperando, chordas interdum nimium distendebat, interdum eas nimium relaxabat." Atque certissimum est; nihil auctoritatem æque destruere, ac inæqualem, et quasi

subsultoriam, atque intempestivam potentiæ alternationem, nunc rigidius intensæ, nunc laxius remissæ.

Veruntamen et hoc verum est, moderni temporis prudentiam, circa principum negotia tractanda, in hoc potissimum versari, ut conquirantur magis et aptentur remedia et subterfugia malorum et periculorum, cum ingruerint; quam ut prudentia solida et constanti, depellantur et summoveantur, antequam impendeant. Verum hoc nihil aliud est, quam in agone, cum fortuna, experiri. Caveant autem homines, ne obdormiscant circa turbarum materias primas, et inchoamenta. Nemo siquidem scintillam, incendium parituram, prohibere potest; nec regiones metiri, unde eruptura sit. In principum negotiis, interveniunt proculdubio, multæ difficultates et impedimenta; at sæpenumero maxima impedimenta sunt, principum ipsorum affectus et mores. Etenim principibus frequenter accidit, ut contradictoria plane appetant; sicut recte Tacitus; " Sunt plerunque regum voluntates vehementes, et inter se contrariæ." At potentiæ nimiæ solœcismus est, credere se posse finem rei pro arbitrio assequi, neque tamen media procurare.

Regibus intercedit negotium cum nationibus vicinis, cum uxoribus propriis, cum liberis suis, cum prælatis et clero, cum proceribus regni, cum nobilibus secundæ classis sive generosis, cum mercatoribus suis, cum plebe regni, cum militibus suis. Atque a singulis horum impendent pericula, nisi adhibeatur cura.

Quod ad vicinos attinet, præscribi non potest regula aliqua certa cautionis, propter occasionum varietatem; unica excepta; quæ semper tenet. Ea est, ut principes huic rei perpetuo invigilent, ne quis ex vicinis in tantum excrescat; (vel novis territorii augmentis, vel commercium ad se trahendo, vel propius accedendo, et similibus;) quo majorem nanciscatur lædendi potestatem, quam antea habuerat. Sane, durante triumviratu illo regum; (Henrico octavo Anglo, Francisco primo Gallo, et Carolo quinto Hispano;) ea viguit inter ipsos diligentia, ut nemo trium vel palmam terræ acquirere potuisset, quin reliqui duo statim rem ad æquilibrium deducerent; neque pacem fœnore redimere sustinerent. Idemque præstabat fœdus illud, (cui Guicciardinus securitatem Italiæ attribuit,) ictum inter Ferdinandum regem Neapolitanum; Lorenzium de Medices, et Ludovicum Sforzam, principes; alterum Florentiæ, alterum Mediolani. Neque recipienda est opinio, quorundam ex scholasticis; " Bellum juste suscipi

non posse, nisi ob injuriam, aut provocationem præcedentem." Siquidem justus metus imminentis periculi, etsi violentia aliqua non præcesserit, procul dubio Belli causa est competens et legitima.

Quantum ad uxores; extant exempla ejus generis crudelia et atrocia. Livia infamis ob veneficium Augusti. Roxolana, uxor Solymanni, perniciem intulit Mustaphæ celeberrimo illi principi; atque alias successionem, et domum, mariti sui, perturbavit. Edwardi secundi regis Angliæ uxor, operam præbuit præcipuam, in mariti sui de regno deturbatione, et nece. Hoc genus periculi maxime timendum, cum reginæ liberos ex priore marito susceperunt, aut in adulterio degunt.

Quantum ad liberos; ab iis etiam ortæ tragœdiæ plurimæ. Atque generaliter, suspiciones arreptæ a patribus, in filios suos, infaustæ extiterunt. Mustaphæ (quem antea nominavimus) cædes, stirpi Solymanni adeo fatalis fuit, ut successio sultanorum, usque in hodiernum diem, pro suspecto habeatur, velut sanguinis ementiti, quia Selymus secundus putabatur suppositicius. Cædes etiam Crispi, principis summæ spei, inflicta per patrem suum Constantinum Magnum, similiter ejus familiæ fatalis fuit; siquidem, tam Constantinus, quam Constans, filii ejus, violenta morte perierunt; et Constantius, qui ex filiis ejus superstes fuit, decessit sane ex morbo, sed non nisi cum Julianus contra eum arma cepisset. Cædes similiter Demetrii, Philippi secundi Macedonis filii, vertit se in patrem, qui mortuus est ex mœrore et pœnitentia. Complura sunt ejusmodi exempla: verum pauca, aut nulla, ubi patres aliquid boni, ex hujusmodi diffidentiis, perceperunt; præterquam cum filii bellum aperte patribus intulerunt; ut fecit Selymus primus adversus Bajazetem patrem suum; et tres filii Henrici secundi, regis Angliæ.

Quantum ad prælatos; ab illis etiam, si potentes fuerint et superbi, periculum ingruit. Ut contigit temporibus Anselmi, et Thomæ Becketti, archi-episcoporum Cantuariæ; quorum baculi pastorales cum regis gladio concertarunt; licet res illis fuerit, cum regibus animosis et fastuosis; Guilielmo Rufo, Henrico primo, et Henrico secundo. At periculum hujusmodi, a prælatis, non est magnopere pertimescendum, nisi ubi clerus ab auctoritate et jurisdictione principatus externi pendet; aut etiam ubi ecclesiastici eliguntur a populo; non autem a rege, vel patronis ecclesiarum.

Quantum ad proceres; sunt illi certe cohibendi, et tan-

quam in justa distantia a solio regali continendi; verum depressio ipsorum, poterit regem fortasse ipsum magis absolutum reddere, sed interim minus tutum; et minus efficacem ad ea quæ cupit perficienda. Hoc notavi, in historia mea regni Henrici septimi, qui nobiles suos perpetuo deprimebat: unde factum, ut tempora ejus difficultatibus et turbis plena essent. Nobiles enim, etsi in fide et officio, versus eum manserint, attamen minime cum eo cooperabantur in negotiis suis; ita ut ipse fere omnia solus sustineret.

Quatenus ad nobiles secundæ classis; parum periculi ab illis manare potest, cum sint corpus dispersum. Poterint illi quidem nonnunquam grandia loqui, sed non multum nocere. Quinimo fovendi sunt, tanquam qui potentiam nobilitatis superioris optime temperent, ne immodice excrescat: atque rursus cum populi gubernacula immediate tractent, motus populares optime compescunt.

Quod ad mercatores; sunt illi instar venæ portæ: qui nisi floruerint, potest quidem regnum aliquod, artus habere robustos, sed venas vacuas, et habitum corporis macrum. Vectigalia et portoria immodica, raro regis reditus adaugent. Etenim quod in partibus lucretur, in summa deperdit; commercii quanto diminuto.

Quantum ad plebem; ab iis raro creatur periculum, nisi habeant ductores potentes et populares; aut si introducas mutationem in religione; vel in consuetudinibus antiquis; vel in gravaminibus tributorum; vel in aliis quæ victum eorum decurtant.

Quantum denique ad milites; periculosissima res est, si in corpus unum cogantur, vel exercitus, vel præsidiorum; et donativis insuescant. Cujus clarissima cernimus exempla, in janizariis et prætorianis. Verum militum conscriptio, et ad arma tractanda instructio, et in locis diversis, et sub diversis ducibus, et sine donativis; res sunt utiles, et salubres, et sine periculo.

Principes corporibus cœlestibus similes: quæ tempora felicia, aut infelicia, in fluxu suo producunt; quæque veneratione multa gaudent, requie nulla. Omnia circa reges præcepta, duobus illis monitis clauduntur; "Memento quod es homo;" et, "Memento quod es Deus, seu Vicedei:" quorum alterum pertinet ad potestatem eorum coercendam, alterum ad voluntatem regendam.

XX. DE CONSILIO.

Summa quæ intercedit inter homines fides, est illa consilium impertiendi. Etenim in alio quovis fidei genere, partes tantum vitæ aliis commendamus; terras, bona, liberos, existimationem, et alia negotia particularia; verum iis quos nobis consiliarios adhibemus, omnia mandamus. Quanto magis, qui partes consiliariorum præstant, ad omnem integritatem et sinceritatem astringuntur? principes vel prudentissimi, nullo modo in diminutionem auctoritatis accipiant, si consilio virorum selectorum utantur. Quin et Deus ipse consilio non vacat; sed inter nomina magna Filii sui benedicti ponit; ut consiliarius vocetur. Solomonis certe pronunciatum tale: "In consilio stabilitas." Res humanæ procul dubio, aut primam, aut secundam agitationem subibunt: si minus consultationum argumentis jactentur, certe fluctibus fortunæ jactabuntur; plenæque evadent, inconstantiæ, et mutationum, modo texendæ, modo retexendæ, instar vacillationum hominis ebrii. Sane filius Solomonis vim consilii expertus est, quemadmodum pater ejus necessitatem et usum vidit. Etenim regnum Deo dilectum, primo laceratum et fractum est, consilio pravo. Cui quidem consilio inustæ sunt, ut nobis sint documento, notæ illæ duæ, per quas consilia prava, in perpetuum, dignoscantur; una, quod fuerit consilium juvenile quoad personas; altera, quod fuerit violentum quoad subjectum.

Sapientia veterum in parabola adumbravit, tam unionem et insolubilem conjunctionem consilii cum regibus; quam prudentem et politicum usum ejusdem per reges adhibendum. Alterum in eo, quod Jovem narrant Metim, (quæ vox consilium significat,) in uxorem duxisse; in quo innuunt consilium imperio sponsæ loco esse. Alterum in eo quod sequitur: quod hujusmodi commentum est. Tradunt, postquam Metis nupta fuisset Jovi, eam gravidam ex illo factam: Jovem autem non sustinuisse donec pareret, sed eam devorasse; unde ipsum quoque gravidum factum, et Palladem armatam ex capite suo edidisse. Quæ fabula portentosa arcanum imperii involvit: hoc nimirum; ad quem modum reges, erga consilium suum sanctius, se gerere debeant: primum, ut res deliberandas illis committant; quod est veluti prima conceptio: secundo, cum elaboratæ et efformatæ fuerint, veluti in utero consilii sui; atque maturuerint, et partui vicinæ sint; tum demum non permittant amplius consilio suo ut decretum perficiant, ac si

res ex eorum auctoritate penderet; sed negotium ad se retrahant, et palam omnibus faciant; decreta et ordinationes ultimas, (quæ, quoniam cum prudentia et potestate exeunt, assimilantur Palladi armatæ,) a seipsis emanare: neque solum ab auctoritate sua, verum etiam, (quo magis existimationem suam evehant,) ab ingenio et auctoritate propria provenire.

Dicamus jam de incommodis consilii; et de ipsorum remediis. Incommoda, quæ se produnt, in consilio utendo, et adhibendo, sunt tria. Primo, quod hæc res, negotio minus reddat secreta. Secundo, quod derogare videatur de auctoritate principum, ac si minus ex se penderent. Tertio, quod subsit periculum a consiliis infidelibus, quæ tendant potius in commodum consulentis, quam principis ipsius. Ad quæ mala evitanda, doctrina quorundam ex Italis; et practica apud Gallos, temporibus quorundam regum, introduxit consilia interiora, quæ vulgo vocantur cabinetti: remedium sane morbo deterius.

Quantum ad occultationem consiliorum; non tenentur principes, omnia cum omnibus consiliariis communicare; sed tam personas, quam negotia, cum delectu, excerpere possunt. Neque necesse est principi, qui deliberat quid sit agendum, simul detegere quid in animo habeat statuere. Verum caveant principes, ne propalationis negotiorum suorum, ipsi in causa sint. Quatenus vero ad consilia, quos diximus cabinettos, in illos diverbium illud competit; "Plenus rimarum sum." Futilis quispiam, qui gloriæ sibi duxerit, arcana nosse et retegere; plus nocebit, quam complures, qui bene norunt, officii sui esse, eadem reticere. Verum est, intervenire negotia quædam, ejus generis, quæ occultationem summam requirunt, qualis non facile ultra notitiam unius aut duorum præter ipsum regem, excedet: neque improspere cedere solent istiusmodi consilia: nam præterquam quod secreta sint, procedunt plerunque constanter, et uno quasi spiritu reguntur, absque contentione. Sed tum demum, hoc recte cedet, si rex prudens sit, et proprio marte validus; et simul consiliarii illi sint sagaces; et ante omnia, finibus, quos sibi proponit rex, fidi. Id quod contigit Henrico septimo Angliæ regi: qui arcana sua majoris momenti, duobus tantummodo consiliariis impertiebatur, Mortono, et Foxo.

Quantum ad auctoritatem minuendam; fabula remedium monstrat. Imo majestas regum, exaltatur potius quam deprimitur, cum in cathedra consilii sedeant. Neque un-

quam invenire est principem, auctoritate sua imminutum, per consilium suum; nisi forte ubi obtigerit, potentia nimia in uno aliquo consiliario; aut nimis arcta combinatio inter diversos: quæ duo mala cito deprehenduntur, et sanantur.

Quantum ad postremum incommodum; consiliarios nimirum, in consilio dando, suæ rei prospecturos, non domini; minime dubium est; Scripturam illam; "Non inveniet fidem super terram," intelligi debere de natura temporum, minime de personis singulis. Reperiuntur siquidem viri, fideles, sinceri, candidi, et veraces; minime vafri aut involuti. Asciscant sibi principes, ante omnia, ingenia talia. Præterea consiliarii raro ita inter se uniuntur, quin alius super alium excubias agat; adeo ut, si quis consilia det factiosa, aut ad privatos fines collimantia, celeriter hoc ad aures principis deveniet. Remedium autem præstantissimum fuerit, si reges dent operam ut consiliarios suos pernoscant; quemadmodum illi, ut principem;

Principis est virtus maxima nosse suos.

Contra vero, consiliarios non decet, nimios esse rimatores, in personam principis sui. Vera enim consiliarii constitutio hæc; ut peritior sit in negotiis principis, quam in moribus ejus. Sic enim verisimile fiet, eum consilium potius recta directurum, quam se principi accommodaturum quo complaceat. Principibus etiam hoc magno usui esse possit; si opiniones et vota consiliariorum suorum, et divisim, et conjunctim, recipiant. Etenim opinio, in secreto prolata, liberior multo est; sed illa quæ coram aliis, gravior. Nam in privato quisque propriis affectibus plus inservit; in consortio aliorum affectibus magis obnoxius est: itaque neutrum omittendum; atque ab inferioribus, in privato potius, ut libertati consulatur; a grandioribus, in consortio potius, ut modestius sententiam ferant. Nil prodest, si principes de rebus deliberent, nisi diligenter quoque deliberent de personis: etenim res omnes, tanquam imagines mortuæ; vita autem actionis in delectu personarum potissimum consistit. Neque sufficit de personis deliberare, secundum genera, veluti in idæa quadam, aut descriptione mathematica; qualis videlicet character et conditio personæ esse debeat: etenim errores maximi interveniunt, et judicii libra maxime versatur, in delectu individuorum. Illud quoque memoria tenendum; optimi consiliarii mortui: libri veritati non parcunt, cum consiliarii forte in adula-

tionem lapsuri sint. Utile itaque fuerit, libros multum revolvere; præsertim eorum auctorum, qui et ipsi gubernacula rerum tractarunt.

Consilia, hac ætate, in locis plurimis, nihil aliud fere sunt, quam congressus, et colloquia familiaria: ubi res potius sermonibus jactentur, quam debitis argumentis trutinentur. Atque plerunque præcipitanter nimis, ad decretum vel actum consilii, properatur. Satius esset, si in majoris momenti negotiis, res uno die deliberanda proponeretur, altero tractaretur; "In nocte consilium." Id certe præstitum est, in tractatu unionis, inter delegatos Angliæ et Scotiæ; qui conventus, regulariter, et optimo ordine, processit. Ad petitiones autem privatas, dies aliquos præfigi probo: nam et supplicantibus tempora certa indicant, quibus commodius se applicent; et solenniores conventus exonerant, ut possint hoc agere. In delectu deputatorum, qui negotia ad consilium informandum præparent, præstat eos eligere, qui æqui sint, et in neutram partem propendeant; quam æquitatem quandam creare, introducendo aliquos qui utrique parti sedulo faveant. Probo etiam delegationes, non tantum temporaneas, aut e re nata; sed etiam continuatas, et perpetuas. Exempli gratia; quæ curent separatim, commercia; ærarium; bellum; gratias; gravamina; provincias particulares. Sane, ubi in usu sunt consilia subordinata diversa, atque unicum tantum superius consilium, (ut sit in Hispania,) nihil aliud fere sunt ejusmodi consilia, quam deputationes (quales diximus) perpetuæ, nisi quod majore auctoritate polleant. Si casus postulet, ut informetur consilium, ab hominibus alicujus muneris aut professionis particularis, (veluti jurisperitis, nauticis, excusoribus nummorum, mercatoribus, artificibus, et similibus,) audiantur illi primo coram delegatis; et postea, prout occasio postulat, coram consilio. Neque permittantur venire catervatim, aut more tribunitio se gerere; hoc enim foret, clamoribus consilium fatigare, non informationem, ut decet, exhibere. Mensa oblonga, et rursus quadrata, sive sedes ad parietes cameræ consilii, videri possunt, formalia tantum, sed sunt profecto realia: nam ad mensam oblongam, pauci qui prioribus locis sedent, res quasi soli transigunt; verum in aliis, quas diximus, figuris, major usus consiliariorum qui inferius sedent. Rex, cum præsidet ipse in consilio, caveat, ne sententiam suam, citius quam par est, declaret: hoc si fecerit, consiliarii se ad nutum ejus applicabunt; et loco consilii liberi, canticum ei occinent; "placebo."

XXI. DE MORA.

FORTUNA foro rerum vœnalium similis est; ubi sæpe (si paululum expectare poteris,) minuetur pretium. Rursus, aliquando Sibyllæ licitationibus assimilatur; quæ primo plenas offert merces, mox partes aliquas consumens, integrum tamen pretium postulat. Nam " occasio (ut in trito habetur carmine,) occipitium nobis obvertit calvum, postquam capillorum in fronte copiam fecit non arripientibus :" vel saltem utris ansam præbet primo accipiendam; dein ventrem, qui difficilius comprehenditur. Nusquam certe major apparet sapientia, quam in tempestivis negotiorum auspiciis, principiisque eligendis: non jam levia sunt pericula, si levia videantur; et plura pericula fefellerunt, quam vim intulerunt. Quinimo, satius est, quibusdam periculis, quasi media via occurrere, quam eorum motus, et appropinquationem, perpetuo inquirere, et observare. " Qui enim nimium invigilat, interdum dormitat." E-contrario, umbrarum longitudine decipi, (ut quidam olim, quando luna horizonti proxima, hostium terga irradiabat,) atque ita ante tempus tela emittere; aut pericula, præmature obviando, accersere, alterum est extremum. Nam opportunitatis maturitas, vel immaturitas, est (ut antea diximus) ad amussim examinanda. Ac, ut plurimum, expedit, omnium magnorum negotiorum principia, Argo cum centum oculis suis, exitus vero, Briareo cum centum manibus suis, committere: primum scilicet invigilare, postea accelerare. Etenim Orci galea, quæ politicum vere reddit invisibilem, est, consiliorum occultatio, et expeditionum celeritas. Cum enim ad executionem ventum sit, nulla occultatio celeritati est æquiparanda; more globuli e tormento emissi, qui tam velocitur pertransit, ut ipsam oculorum aciem antevertat.

XXII. DE ASTUTIA.

PER astutiam intelligimus, sinistram quandam et obliquam prudentiam. Et pro certo est, multum interesse, inter astutum, et prudentem; non solum, quatenus ad probitatem, sed etiam quatenus ad mentis vires. Sunt qui chartas pictas artificio quodam miscere sciunt, qui tamen periti lusores non sunt; sunt itidem nonnulli, qui in competitionibus, et factionibus regendis, multum valent, alias

vero infirmi judicii sunt. Rursus, alia res est personarum naturas et mores callere, alia vero negotia pernosse: sunt enim haud pauci, qui in personarum aditibus, et temporibus, versuti sunt, neque tamen partis realis, negotiorum, sunt capaces: quæ est constitutio ipsissima hominum; qui in personis dignoscendis, non in libris evolvendis, operam collocarunt. Tales magis in pragmaticis adhiberi debent, quam in consiliis; et non aliter fere usum sui præbent, quam in viis, quas sæpe contriverunt. Converte eos ad homines novos, et artibus suis excidunt: adeo ut, vetus illa regula, stultum a sapiente dignoscendi, ("Mitte ambos ad ignotos et videbis,") de hujusmodi hominibus non teneat. Quoniam autem astuti isti homines, similes sunt pusillarum mercium propolis, non abs re fuerit, officinas ipsorum excutere.

Inter astutias numerari potest, ut quis vultum ejus cum quo colloquitur, limatius observet: quod etiam jesuitæ præcipiunt. Sunt enim complures, iique ex prudentioribus, qui corda habent obscura, vultus autem pellucidos. Verum, decet hoc fieri, cum modesta oculorum, per vices demissione, quemadmodum et faciunt jesuitæ.

Altera existit astutia, ut cum aliquid propere, et facile obtinere et expedire cupias, personam cum qua agis, de alio quopiam negotio sermonem inferendo, deteneas et præoccupes; ne nimium ad objectiones et scrupulos evigilet. Equidem noveram consiliarium quendam, et secretarium, qui nunquam ad Elizabetham reginam Angliæ, ad diplomata manu reginæ signanda, accessit, quin a principio illam, in aliquos de rebus status gravioribus sermones perduceret, ut hisce intenta ad diplomata minus animum adjiceret.

Idem valet subitæ prehensionis ratio, si quis rem proponat, quando persona, cum qua agitur, ad alia festinat, neque moram pati potest rem accuratius considerandi.

Si cui in animo est, negotium aliquod destruere, quod alius fortasse quispiam dextre et cum effectu propositurus fuisset, ipse se erga negotium bene affectum simulet, atque ipse rem proponat, sed eo modo, ut successum ejus disturbet.

Abruptio sermonis in medio, quasi quis seipsum deprehenderet, et contineret, majorem generat appetitum, in eo quocum colloqueris, ad ulterius inquirendum.

Quoniam autem imprimit fortius quod quæstione erutum est, quam quod sponte oblatum, possis ad inescandam quæstionem insolitum induere vultum: ex quo occasio

detur alteri interrogandi, quid sibi velit ista oris mutatio? Ut Nehemias fecit; "Neque ante illud tempus tristis fueram in conspectu regis."

In rebus ambiguis, et ingratis bonum est initia, de iis sermonem inferendi, alicui alteri deputare, cujus verba minoris sint ponderis, et majoris auctoritatis vocem, in subsidiis reservare, veluti casu fortuito intervenientem, ut interrogetur ille superveniens, de eo sermone, qui ab altero injectus est. Quod fecit Narcissus, cum indicaret Claudio, matrimonium Messalinæ et Silii.

In rebus, quas a se amoliri quis cupiat, non inutile est, vulgi nomen mutuari: ac si quis tali formula utatur; "Hoc vulgo dicitur," aut "Increbuit sermo."

Noveram quendam, qui cum literas scriberet, id, quod maximi erat momenti, post-scripto semper includebat, ut rem fere prætermissam.

Noveram et alium, qui cum ad colloquium cum alio veniret, id quod maxime ei in sermone curæ erat, præterire solitus erat, et discedere, et rursus redire, et tum demum ejus rei mentionem facere, ac si illa fere e memoria excidisset.

Alii se subito deprehendi procurant, tali tempore, quo verisimile est, partem cui insidiantur, superventuram: ac simul se chartam aliquam, in manu habentes, aut aliquid præter consuetudinem agentes, inveniri volunt; ut interrogentur de iis rebus, quas revera ipsi eloqui cupiunt.

Astutiæ species satis vafra est, ea verba proprio nomine prolata, sibi excidere pati, quæ alium arripere, et iis uti, quis expetit, ut inde alterum irretiat, et subruat. Noveram duos, pro officio secretarii, tempore reginæ Elizabethæ competitores; qui tamen se invicem amice tractabant. Quique de negotio ipso competitionis suæ sæpius conferebant: atque alter ipsorum dicebat; "Fieri secretarium in declinatione monarchiæ," rem esse haud parvi periculi; seque illud genus honoris minime ambire. Alter statim verba illa, callide prolata, bona fide arripuit; et cum amicis suis nonnullis libere sermones conseruit, dicens, se in declinatione monarchiæ muneris secretarii ambitiosum esse non debere. Prior ille occasione usus est, eaque verba ut ad reginæ aures pervenirent, tanquam scilicet ab altero prolata curavit: quæ indignata circa illa verba, in declinatione monarchiæ, cum ipsa se vigentem reputaret, posterioris illius competitionem, nunquam postea admisit.

Est astutiæ quoddam genus, quod Anglico proverbio, "Felem in aheno vertere," satis absurde dicitur; cum ea

verba, quæ quis apud alium profert, imputat colloquenti, tanquam ab ipso prolata. Et, ut verum dicamus, cum talia aliqua verba inter duos agitata fuerint, difficile est probare et verificare, ab utro primum incœperint.

Est artificium in usu, ut quis in alios spicula quædam oblique torqueat, justificando seipsum, per negativas, utpote dicendo; "Hoc ego non facio;" ut tigillinus fecit Burrhum sugillando; "Se non diversas spes, sed incolumitatem imperatoris, simplicitur spectare."

Nonnulli in promptu habent tot narrationes et historiolas, ut nihil sit quod insinuare cupiunt, quin id historiola aliqua involvere possint: unde, et semagis in tuto continent, quasi nihil diserte affirmantes, et rem ipsam majore cum voluptate spargi efficiunt.

Bonum est astutiæ genus, ut quis responsum, quod obtinere cupit, conceptis verbis proponat. Etenim alteram partem minus hærere facit.

Mirum est cernere, quamdiu nonnulli occasionem captent, dicendi illud, quod proferre cupiunt, et quanto circuitu uti sustineant; et quot alia attingere, ut quo volunt perveniant. Res certe hæc, magnæ patientiæ, sed multi usus.

Improvisa, et audax quæstio, aliquando hominem deprehendit, et detegit. Simile quiddam evenit cuidam, qui nomen mutaverat, et in templo divi Pauli obambulans, fuit ab alio, per nomen suum verum, a tergo compellatus, ad quod statim retrospexit. Verum merces hæ pusillæ, et astutiæ minores, sunt infinitæ. Neque male factum esset, si quis earum conficeret uberiorem calalogum; Quoniam nihil rebus obest magis, quam quod astuti recipiantur pro prudentibus.

Illud pro certo habendum, nonnullos, negotiorum periodos et pausas, nosse, qui in ipsorum viscera, et interiora, penetrare nequeunt: ut reperiuntur ædes nonnullæ, quæ gradus nactæ sunt commodos, et anticameras, sed absque cubiculo aliquo pulchriore. Itaque tales videbis in conclusionibus deliberationum commodos quosdam exitus reperire. Ad rem vero examinandam, et disceptandam, nullo modo sufficere. Attamen, sæpenumero ex hac re existimationem quandam aucupantur; veluti ingenia quæ ad decernendum, potius quam disputandum, sint aptiora. Sunt qui magis innituntur dolis, quos aliis struunt; quam consiliis solidis et sanis; sed Solomon ait; "Prudens advertit ad gressus suos; stultus divertit ad dolos."

XXIII. DE PRUDENTIA QUÆ SIBI SAPIT.

Formica animalculum sibi sapiens, sed in hŏrto nocivum. Et sane fit, ut qui sui nimium amantes sint, reipublicæ lædant. Partire itaque moderate, inter amorem tui ipsius, et amorem reipublicæ: atque ita tibi sis proximus, ut in alios non sis injurius: præsertim, in regem tuum, aut patriam. Centrum plane ignobile est, actionum hominis cujuspiam; commodum proprium. Recte terrestrem naturam sapit. Terra enim suo stat fixa centro; ubi quæ affinia cœlestibus sunt omnia, moventur super centrum alterius, cui benefaciunt. Ad se omnia referre, tolerabilius est in viris principibus; quia ipsi intra personam suam non consistunt; sed publico periculo, et fortuna, degunt. Verum in servo principis, aut cive reipublicæ res est perniciosissima. Etenim negotia publica universa, quæ ab id genus homine expediuntur, ad Fines proprios flectuntur; quos necesse est, eccentricos sæpe esse, ad fines domini, sive status sui. Eligant itaque principes, et status, ministros et servos, qui hac nota non maculantur; nisi velint res suas accessorii tantum loco esse. Imo quod hunc effectum reddit magis exitiosum, illud est; quod amittitur plane rerum analogia. Satis enim iniquum esset, si bonum servi, præferatur bono domini; sed adhuc longe iniquius est, cum exiguum bonum servi, antefertur magno bono domini. Veruntamen id sæpius factum est, per officiarios pravos; veluti thesaurarios, legatos, duces, et alios servos aut ministros infideles et improbos: qui globulo suo pondus addunt finium suorum minutorum, quod eum in transversum inclinet utilitatis domini sui, in rebus gravioribus et magni momenti. Et plerunque commodum, quod ejusmodi servi ad se attrahunt, est pro modulo fortunæ propriæ; at detrimentum, quocum permutent commodum illud, est pro modulo fortunæ domini sui. Siquidem philantorum istiusmodi ingenium patitur; ut non morentur domum proximi incendere, pro re nihilo majore, quam ad assanda ova sua. Veruntamen hujusmodi ministri, haud raro, apud viros potentes, gratia pollent; quia illis jucunda procurant, sibi utilia: atque utriusvis rei causa, fortunam domini sui prodent.

Prudentia quæ sibi uni sapit, in plurimis ejus ramis, res sane depravata. Assimilanda sapientiæ soricum, qui domum aliquam pro certo deserent, paulo ante ruinam: sapientiæ vulpis, quæ taxonem e domo expellit, quam sibi defodit, non illi: sapientiæ crocodili, qui lachrymas emittit,

cum devorare cupit. Verum illud imprimis observationem meretur; quod hujusmodi homines, qui (ut Cicero loquitur de Pompeio,) " sui sunt amantes sine rivali ;" sæpenumero infortunati sint: cumque sibi, per totam vitam, sacrificaverint, in exitu sacrificant inconstantiæ fortunæ; cujus alas sperabant se pulchra illa sapientia sua præscidisse.

XXIV. DE INNOVATIONIBUS.

Sicut partus recens editi informes sunt, sic videre est in novis institutis, quæ sunt partus temporis. Veruntamen, ut qui in familiam suam honores primi introducunt, posteris suis plerunq; dignitate prælucent; ita rerum exemplaria, et primordia, (quando feliciter jacta sunt,) imitationem ætatis sequentis, ut plurimum, superant. Malum enim, in natura humana, naturali motu fertur, qui processu invalescit; at bonum, ut fieri amat in violentis motibus, in primo impetu fortissimum. Certe, omnis medicina innovatio est: et qui nova remedia accipere nolit, nova mala expectet. Novator enim maximus omnium tempus. Quod si tempus, decursu solo, res in pejus ferat; prudentia vero et industria, eas in melius restituere non contendat, quis tandem erit finis mali? Hoc concedi prorsus debet; quod consuetudine firmatum est, etsi minus sit bonum, aptum esse tamen temporibus; quæque uno quasi alveo fluxerunt, fœdere quodam conjuncta esse; ubi contra nova veteribus non usquequaque tam concinne cohæreant: Etsi enim utilitate juvent; novitate tamen et inconformitate turbant. Sunt certe novitates, tanquam advenæ aut peregrini, quos admiratione plus, minus benevolentia prosequimur. Recte quidem hæc omnia, si tempus quiesceret; hoc tamen indefesse in orbem agitatur. Inde fit, ut importuna et morosa moris retentio, res turbulenta sit, æque ac novitas; et qui vetera superstitiose nimis reverentur, cedant in præsentis seculi ludibrium. Prudenter igitur facient homines, si, in innovationibus suis, a tempore exemplum petant: tempus enim innovat vel maxime, sed tacite, pedetentim, ac sine sensu. Illud enim pro certo habeas; quod novum est præter spem et expectationem accedere; et huic adjicere aliquid, illi eripere; at cui incremento est novitas, ille fortunæ gratias habet, et tempori; cui vero nocumento, is novitatis auctorem injuriarum postulat. Expedit præterea, experimentis novis, in corporibus politicis medendis, non uti; nisi urgens incumbat necessitas, aut evidens se

ostendat utilitas: et sedulo cavere, ut reformationis studium mutationem inducat, non autem studium mutationis reformationem prætexat. Quinetiam omnis novitas, quam rejicere fortasse non datur, pro suspecta tamen haberi debet. Denique, ex Scripturæ monito; "Stemus super vias antiquas, atque circumspiciamus, quæ sit via bona, et recta, et ambulemus in ea."

XXV. DE EXPEDIENDIS NEGOTIIS.

Celeritas nimia et affectata, negotia, ut plurimum, perdit. Similis est illi rei, quam medici prædigestionem, sive præproperam digestionem, vocant: quæ corpus implere solet humoribus crudis, et secretis seminibus morborum. Itaquæ negotiorum expeditionem ne metiaris, per tempora consulendi, sed per negotii ipsius progressum. Et quemadmodum in cursu, minime in passus granditate, aut pedum elevatione altiore, celeritas consistit, sed in motu eorundem humiliore, et æquabili; ita in negotiis, mordicus rei inhærere, neque partem negotii nimiam pro una vice avide amplecti, celeritatem in conficiendo procurat. Curæ est nonnullis illud tantum, ut brevi tempore multum confecisse videantur; aut ut periodos aliquas negotiorum falsas confingant, quo acres in negotiis existimentur: verum aliud est, tempori parcere, negotium contrahendo, aliud intercidendo: negotia autem in eum modum tractata; crebris nimirum congressibus; plerunque sursum deorsum feruntur, magna inconstanita. Novimus virum prudentem, cui semper in ore erat, cum festinationem nimiam videret; "Manete paulisper, ut expediamus celerius."

Ex altera parte, vera celeritas, in expediendis negotiis, res est pretiosa. Tempus siquidem negotiorum, sicuti pecunia mercium, est mensura: emitur igitur negotium magno, ubi nimia est protractio. Spartani, et Hispani, tarditatis notati sunt: "Mi venga la muerte de Spagna:" Veniet mors mea ab Hispania: tum, scio, cunctanter veniet.

Aurem illis præbe facilem, quibus primæ in informatione negotii, partes demandatæ sunt: et potius viam illis monstres ab initio, quam postea in orationis filo crebrius interrumpas. Qui enim in ordine, quem sibi præstituit; perturbatur, subsultabit, et prolixior fiet, dum memoriam suam recolliget; quam alias futurus fuisset, si sua methodo

perrexisset. Sed interdum videre est, moderatorem molestum esse magis, quam oratorem.

Repetitiones plerunque cum temporis jactura fiunt: attamen statum quæstionis sæpe repetere, lucrum est temporis vel maximum. Etenim complures sermones, prorsus abs re, in ipso partu, abigit. Orationes prolixæ et curiosæ, æque expeditioni negotiorum conveniunt, ac toga prælonga, terram verrens, cursui. Præfatiunculæ, transitiones bellæ, et excusationes, atque alia verba, quæ ad personam loquentis referuntur, tempus haud parum devastant; et licet a modestia emanare videantur, sunt tamen revera gloriolæ captatrices. Sed cave, ne in rem ipsam, ab initio, descendas, cum in hominum voluntatibus, impedimentum aliquod reperiatur, aut obstructio: etenim animorum præ-occupatio sermonum semper postulat præfationes: instar fomentationis ante unguentum, quo unguentum mollius subintret.

Ante omnia, ordo, et distributio, et partium apta extractio, celeritatis tanquam vita est: ita tamen ut distributio non sit nimium subtilis. Nam qui partitione non utetur, in negotia nunquam commode ingredietur; qui autem nimia utetur, vix emerget. Tempora prudenter deligere, tempus plurimum lucratur; atque intempestiva propositio, nil aliud, quam aerem verberare, et tempore abuti. Tres sunt negotiorum partes: præparatio; cousultatio sive examinatio; et perfectio: harum, (si expeditioni consulere in animo est,) media, sit opus multorum; prima autem, et ultima, paucorum procedendi in negotiis, initium sumere, ab iis quæ scripto comprehensa sunt, plerunque expeditionem promovet: licet enim contigerit, ea in totum rejici, nihilominus negativa illa, plus valebit ad consilia educenda, quam indefinita; quemadmodum cinis magis generativus, quam pulvis.

XXVI. DE PRUDENTIA APPARENTE.

Recepta est opinio, Gallos prudentiores esse quam videntur, Hispanos autem prudentiores videri quam sunt. Sed utcunque se res habeat inter gentes, certum est hoc usu venire inter personas singulares. Sicut enim loquitur apostolus de pietate; "Speciem pietatis habentes, sed virtutem ejus negantes;" ita certe inveniuntur nonnulli, qui nugantur solenniter, cum prudentes minime sint; "Magno conatu nugas." Res est profecto prudentibus

ridicula, et satyra digna, affectatores istos videre; in quot formas se vertant, et quali utantur arte quasi prospectiva, qua superficies appareat corpus, quod profunditatem, aut dimensionem solidi habeat. Alii tam secreti sunt, et in se declarando parci, ut merces suas, nisi sub obscura luce, ostendere nolint; et videri volunt, plus significare, quam loqui: cumque sibi ipsis conscii sint, se de iis rebus loqui, quas non bene norunt; cupiunt nihilominus videri, se illa nosse, quæ non possunt tuto loqui. Alii vultu et gestu verbis suffragantur, et veluti per signa sapiunt: ut Cicero ait de Pisone; "Respondes, altero ad frontem sublato, altero ad mentum depresso supercilio; crudelitatem tibi non placere." Alii se valere putant, si grande quiddam loquantur, idque stilo peremptorio: itaque nihil morantur, et pro admissis accipiunt, quæ probare non possunt. Sunt, qui, quicquid sub captum eorum non cadit, spernere, aut parvi pendere præ se ferunt, tanquam impertinens et curiosum; sicque inscitiam suam pro judicio limato obtendunt. Alii distinctionem aliquam semper in promptu habent; et plerunque hominum ingenia subtilitate perstringendo, rem prætervehuntur. De quo genere loquitur Aulus Gellius; "Hominem delirum, qui verborum minutiis, rerum frangit pondera." Ad quod exemplum, Plato in Protagora, per ironiam, introducit Prodicum; sermonem integrum contexentem ex distinctionibus, a principio usque ad finem. Generaliter, istiusmodi homines, in consultationibus, negativæ libenter se applicant; et existimationem quandam aucupantur, ex scrupulis et difficultatibus proponendis et prædicendis; etenim cum id quod proponitur, penitus rejicitur, nil ultra restat agendum; sin probatur, nova indiget opera: quod prudentiæ genus spurium negotia prorsus perdit. Ut verbo dicamus; nec mercator aliquis obæratus, nec decoctor rei familiaris occultus, tot artificiis se muniet, ad divitias simulandas; quot homines isti, vera prudentia destituti, utuntur, ad prudentiæ suæ opinionem tuendam. Certe, homines hac prudentia præditi, opinionem vulgi facile aucupari possunt; sed ad negotia gravia tractanda, nemo talium delectum faciat: etenim, ad negotia promovenda, satius proculdubio fuerit, virum eligere paulo absurdiorem, quam hujusmodi formalistam fastidiosum.

XXVII. DE AMICITIA.

Res sane difficilis esset, etiam illi qui dixerit, plus veri ac falsi, idque compendio miscuisse, quam in illo scito; "quicunque solitudine delectatur, aut fera, aut Deus est." Negari enim non potest, quod insitum et latens odium, seu fastidium societatis, si in aliquo deprehendatur, sapiat nescio quid belluinum: illud tamen e converso, quod aliquam divinæ naturæ speciem præ se ferat, falsissimum est; nisi hujusmodi vida solitaria minime ab amore ipsius solitudinis proveniat, sed a studio secedendi, ut altioribus contemplationibus quis vacet: id quod in nonnullis ethnicorum reperitur, sed affectatum et fictum; ut in Epimenide Cretense, Numa Romano, Empedocle Siculo, et Apollonio Tyanæo; sincerum tamen et verum in plurimis eremitarum antiquorum, et in sanctis patribus ecclesiæ. Interea vero parum perspiciunt homines, quid hoc sit quod solitudo nomitatur, et quibus finibus circumscribitur: turba enim non est societas dicenda; et facies hominum nihilo plus sunt quam in porticibus picturæ; colloquia vero absque dilectione cymbalo non præstant tinnienti. Hoc innuit id, quod Latino jactatum proverbio; "Magna civitas, magna solitudo." In magnis enim urbibus amici et necessarii remotius disperguntur, adeo ut minus plerunque familiariter, et in consortio, vivatur, quam in viciniis angustioribus. Quin et ulterius progredi licet, atque verissime asserere, meram et miseram esse solitudinem, ubi desunt amici veri: sine quibus mundus nihil aliud quam eremus est. Quo etiam sensu si solitudinem accipias; quicunque natura et genio suo ab amicitiis abhorret, hujusmodo affectum, a bruto potius, quam ab homine mutuatur.

Maximus amicitæ fructus est levamen et evaporatio anxietatis et tumorum cordis, quos animæ perturbationes, cujuscunque generis, imprimere solent. Novimus morbos illos in corpore esse maxime periculosos, qui ex obstructionibus et suffocationibus nascuntur: neque multo secus se res habet in ægritudinibus animæ. Sarsam adhibere possis ad jecoris, chalybem præparatum ad lienis, flores sulphuris ad pulmonum, castoreum ad cerebri oppilationes deobstruendas: nulla autem invenitur medicina apertiva ad obstructiones cordis, præter amicum fidelem; cui impertire possis, dolores, gaudia, metus, spes, suspiciones, curas, consilia, et quicquid denique cor opprimat, tanquam sub sigillo confessionis civilis.

Res est profecto mirabilis, si quis secum reputet, quam magni principes summi et monarchæ, istum amicitiæ fructum, (de quo loquimur,) æstiment: tanti sane, ut eundem, et incolumitatis suæ, et amplitudinis, periculo, interdum coëmant. Principes enim, propter distantiam et sublimitatem fortunarum suarum, a fortunis servorum et subditorum suorum, fructum hunc decerpere nequeunt: nisi forte, (quo eum melius colligant,) aliquos evehant et promoveant, qui sint sibi tanquam socii et æquales: id quod sæpenumero non sine præjudicio fit. Linguæ modernæ, istiusmodi personas, nomine gratiosorum, vel amicorum regis, insigniunt; ac si res esset favoris et conversationis: at vocabulum Romanum, ejus rei, rectius exprimit, verum usum, atque causam; illos nominans, "Participes curarum;" hoc enim illud est, quod verum ligamen præstat. Atque hoc fecisse manifesto videmus, non tantum principes delicatos, et imbecillis animi; sed etiam prudentissimos, et maxime politicos, ex iis qui regnarunt: qui sæpe sibi adjunxerunt aliquos ex servis suis; quos et ipsi amicos suos vocarunt; et aliis eodem illos nomine insignire permiserunt: non alio utentes vocabulo, quam quod inter homines privatæ fortunæ receptum est.

L. Sylla, postquam Romanum imperium occupasset, Pompeium, (postea cognominatum Magnum,) ad eam potentiam evexit, ut Pompeius superiorem jam Sylla factum se venditaret. Cum enim amicum quendam suum consulem fecisset, contra ambitum Syllæ; atque Sylla in malam partem hoc accepisset, et verba indignationis nonnulla protulisset, Pompeius id minime tulit, sed fere disertis verbis, eum quiescere jussit; addendo; "Plures adorare solem orientem, quam occidentem." Apud Julium Cæsarem, Decimus Brutus, tanta gratia valuit, ut eum Cæsar Octavio, suo nepoti, hæredem substitueri. Atque hic ille fuit, qui Cæsarem ad mortem suam pertraxit. Cum enim Cæsar senatum dimittere in animo habuisset, propter mala quædam præsagia, (præcipue, somnium quoddam uxoris suæ Culpurniæ,) Brutus eum mollitur e cathedra, arrepto brachio ejus, levans, dixit; "Sperare se, eum senatum non tam parvi habiturum, ut dimittere illum vellet, donec uxor somnium melius somniasset." Et videtur sane tanto favore apud Cæsarem polluisse, ut Antonius in epistola quadam, quæ a Cicerone, in una ex Phillippicis, verbatim recitatur, eum veneficum appellaret; ac si Cæsarem incantasset. Augustus Agrippam, ignobilem licet natalibus, ad tantam celsitudinem promovit, ut quando cum

Mæcenate deliberaret de nuptiis filiæ suæ Juliæ; Mecænas eum libere monuisset; "Agrippam, aut in generum assumendum, aut interficiendum; nihil esse tertium; quandoquidem eum ad tantum fastigium perduxisset." Tiberius Cæsar Sejanum tantis honoribus auxit, ut ii duo haberentur tanquam par amicorum: certe Tiberius, in epistola quadam ad eum, ita scribit; "Hæc pro amicitia nostra non occultavi." Atque universus senatus, aram Amicitiæ tanquam deæ, dedicavit: propter arctam inter eos amicitiam. Similis, aut etiam illa majoris, amicitiæ exemplum cernitur, inter Septimium Severum, et Plantainum: etenim, filium suum natu majorem, filiam Plantiani, in uxorem ducere, coegit: ac Plantianum sæpe, etiam cum contumelia filii sui, honoravit. Quin et scripsit ad senatum hisce verbis: "Ita diligo virum, ut cupiam eum mihi superstitem fore." Quod si hi principes, Trajano alicui aut Marco Aurelio, similes fuissent, immensæ naturæ eorum bonitati hoc attribui posset: cum vero viri tam prudentes extiterint, tantoque robore et severitate animi præditi, tamque impensi amatores sui; liquido probatur, eos felicitatem suam, (licet vix major mortalibus ullis obtigisset) veluti mutilam duxisse, nisi per hasce amicitias, facta fuisset integra, et perfecta. Atque, quod majus est, affuerunt his principibus uxores. Filii nepotes; neque tamen hæc omnia, amicitiæ solatia, supplere valuerunt.

Minime oblivioni mandandum, quod Commineus notatum reliquit de domino suo priore, duce Carolo, cognominato Strenuo; eum secreta sua cum nemine communicare voluisse: minime omnium ea, quæ eum præ cæteris angebant. Et ulterius ait; eam animi obtectionem, posterioribus vitæ annis, intellectum ipsius nonnihil debilitasse, et vitiasse. Potuisset certe Commineus, si voluisset, simile judicium facere, de domino suo posteriore, Ludovico undecimo; cui occultatio consiliorum pro tormento fuit. Tessera Pythagoræ, obscura sed optima; "Cor ne edito." Certe, si quis durum huic rei nomen imponeret, qui amicis destiuuntur, quibus cogitationes suas, et anxietatis libere impertiant, sunt cordium suorum anthropophagi. At illud plane ad miraculum proxime accedit, (quocum claudam hunc, de primo amicitiæ fructu, sermonem;) nimirum; istam cum amicis communicationem, contrarios duos effectus producere; gaudia enim conduplicat, mœrores dimidiat. Nemo siquidem læta sua amico impertit, quin lætetur amplius: nemo autem tristibus amicum communicat, quin contristetur minus. Adeo ut revera, eadem

virtute polleat, super animum hominis; quam alchymistæ lapidi suo tribuere solent, super corpus humanum; hoc est; quod contraria operetur, sed semper in beneficium naturæ. Attamen absque auxilio notionum chymicarum, extat hujus rei exemplum insigne, in cursu naturæ ordinario. Nam in rebus naturalibus, unio alit et confortat actiones quasque naturales; impressiones omnes violentas hebetat et retundit: idemque prorsus fit in animis.

Secundus amicitiæ fructus, salubris est intellectui, sicuti primus affectibus. Amicitia enim serenitatem inducit in affectibus, a tempestatibus et procellis; verum in intellectu etiam noctem abigit, et lumen infundit, confusione cogitationum dissipata. Neque hoc intelligendum est tantum, de consilio fideli, quod ab amicis dari solet; sed antequam de illo dicamus; certum est; quicunque animum cogitationibus multis gravatum habet, ingenium ejus et intellectum clarescere veluti in diem, communicatione consiliorum, et discursu cum alio. Etenim cogitationes suas facilius agitat, et in omnes partes versat; easdem ordinatius disponit; illas tanquam in faciem intuetur, postquam conversæ fuerint in verba; denique seipso prudentior evadit: idque assequitur horulæ magis unius sermone, quam diei integræ meditationibus. Recte dictum est a Themistocle, ad regem Persarum; "Sermones tapetibus similes esse, cum explicentur, per quod imagines distincte conspiciuntur; ubi cogitationes, instar sarcinarum quarundam, complicantur et involvuntur." Neque etiam restringitur secundus iste fructus amicitiæ, (qui consistit in obstructionibus intellectus aperiendis,) ad eos solum amicos, qui consilio pollent; (hi proculdubio optimi sunt;) sed et hoc seposito, discit profecto quispiam a seipso; et proprias cogitationes in luminis oras educit; ingeniumque suum tanquam cotem versus acuit, quæ ipsa non fecat. Ut verbo dicamus; præstat statuæ cuidam, vel imagini, se impertire, quam cogitationes suas silentio suffocare.

Adde jam, (ut fiat sermo, de hoc secundo amicitiæ fructu, magis perfectus,) illud modo dictum; quod promptius occurrit, et in vulgarem observationem cadit; fidele intelligo ab amico consilium. Bene asserit Heraclitus, in uno ænigmatum suorum; "Lumen siccum optimum:" atqui certissimum est; lumen quod ab alio proficiscitur, per modum consilii, illo siccius esse et purius, quod a proprio emanat judicio, et intellectu; siquidem quod affectibus semper maceratur et tingitur. Adeo ut, non minus intersit, inter consilium amici, et consilium cujuslibet pro-

prium, quam inter consilia amici, et adulatoris. Neque enim adulator magis infestus, quam quilibet sibi: neque rursus remedium præstantius, contra adulationem sui ipsius, reperitur, quam libertas amici. Consilium duorum generum est. Alterum de moribus; alterum de negotiis. Quantum ad prius. Optimum, ad animi sanitatem tuendam, medicamentum, est admonitio amici fidelis. Seipsum ad rationes stricte reddendas compellere, medicina est interdum, nimis penetrans, et corrosiva. Lectio librorum moralium, res est paulo hebetior. Observatio propriorum defectuum in aliis, tanquam in speculo, aliquando, ut fit etiam in speculis, minus respondet. Verum (ut diximus) optima medicina, (optima ad recipiendum, optima ad operandum;) est admonitio amici. Mirum profecto est videre, quot errores enormes, et plane absurdos, committant aliqui (præsertim ex grandioribus,) quia non adsit iis amicus, qui monere possit: in damnum haud parvum, et existimationis, et fortunæ suæ. Sunt enim, (ut ait apostolus Jacobus,) "tanquam homines, qui intuentur in speculum, et statim obliviscuntur imaginis suæ." Quantum ad negotia. Vetus est; "Melius videre oculos, quam oculum;" licet nonnulli hoc cavillentur: etiam recte dicitur; "Spectatorem sæpe plus videre, quam lusorem:" quin et certius disploditur sclopetum majus, palo innixum, quam super brachium; etsi quidam tam altum sapiant, ut putent in sese esse omnia. Verum, quicquid dici possit in contrarium, certum est, consilium negotia dirigere, et stabilire. Quod si quis secum cogitet, consilium se quidem capturum, sed per partes; in aliis hunc, in aliis illum, consulendo; bene habet; (hoc est; melius illi fuerit, quam consilio omnino non uti;) verum, in duo pericula impingit: unum, quod vix fidele consilium reperturus sit; raro enim, nisi a fideli, et intimo amico consilium datur, quod non ad dantis fines inflexum et detortum sit. Alterum, quod consilia illa, a diversis manantia, (licet cum fide, et bona intentione præstita,) damnosa sæpenumero erunt et nociva; ac partim ex incommodis, partim ex remediis, commixta; veluti, si medicum advoces, qui in curatione morbi illius peritus habetur, sed corporis tui constitutionis penitus ignarus: quare poterit, fortasse, valetudinem, ad tempus, promovere; sed cum periculo, ne, in summa, sanitati præjudicet: atque hoc pacto morbum extinguet, et non ita multo post, hominem. Verum amicus, cui status amici sui perfecte cognitus est, cavebit, ne in præsens juvando, in malum futurum impingat. Itaque consiliis istis dispersis, (ut jam

dictum,) nolim acquiescas: distrahent enim potius, et seducent, quam dirigent et stabilient.

Post nobiles hosce duos amicitiæ fructus; (pacem dico in affectibus, et fulcimentum judicii;) sequitur ultimus; qui similis est malo granato; plenus granis compluribus: intelligo autem auxilium et participationem, in actionibus et occasionibus vitæ. Hic autem, expeditissima via repræsentandi ad vivum, usum multiplicem amicitiæ, fuerit, circumspiciendo et videndo, quam multa sint, quæ per se quispiam exequi commode non poterit: atque inde apparebit, non per hyperbolen, sed sobrie dictum esse ab antiquis; "Amicum esse alterum se:" quandoquidem, si quis vere rem reputet, amici officia, proprias cujusque vires superent. Homines mortales sunt; quin et in medio operum aliquorum, quæ maxime affectant, sæpe moriuntur: veluti in collocatione filii in matrimonium; consummatione conatuum et desideriorum suorum; et similibus. Jam si quis amicum habeat fidelem, securitatem præstat, de iisdem rebus, amici cura et opera, post mortem perficiendis: adeo ut fatum immaturum vix obsit; atqne habeat quis, (ut loquamur more tribulum aut firmariorum,) in desideriis suis, terminum, non unius, sed duarum vitarum. Homo corpore circumscribitur, et corpus loco; verum ubi amicitia præsto est, vitæ munia omnia concessa sunt, et sibi, et deputato suo. Quot numero res sunt, quas per se quispiam, cum dignitate aut decoro, peragere non possit? Merita sua non potest cum verecundia recensere; multo minus extollere: non sustinet quis, ut se submittat, ad supplicandum, aut etiam emendicandum: infinita sunt talia. Verum hæc, et hujusmodi, in amici ore, sat decora sunt; ad quæ erubescimus in persona propria. Rursns, persona cujusque, multa habet conjuncta, quæ exuere non potest: filium alloqui quis non poterit, nisi ut pater; uxorem, nisi ut maritus; inimicum, nisi salva dignitate; ubi amico conceditur loqui, prout res postulat; neque ad respectus personæ alligatur. Verum hæc enumerare infinitum fuerit. Ipse regulam dedi, ubi quis propriam personam, in fabula, sustinere non poterit: amicus si desit, satius est ei scenam derelinquere.

XXVIII. DE SUMPTIBUS.

Opes destinantur sumptibus: sumptus autem honori, et actionibus honestis. Sumptus itaque largiores, occasionis et rei dignitate commensurandi sunt: etenim spontanea paupertas debetur quandoque patriæ, non solum regno cœlorum. Sumptus autem consueti cujusque censu definiendi sunt; eoque tenore temperandi, ut intra reditus sint; nec servorum fraudi, aut incuriæ obnoxii; atque insuper in eum modum dispositi et ordinati, ut rationes impensarum exhibitæ, æstimatione sint minores. Certe, qui diminutionem fortunarum suarum pati nolit, necesse habet impensas suas ordinarias ita instituere, ut dimidia tantum pars redituum insumatur, altera reponatur: qui vero rem augere cupit, tertiam partem solam impensis assignet. Haud sordidum est summis etiam viris, si rationes suas diligenter inspiciant. Hoc omittunt complures, non tam socordia, quam aversatione quadam, ne se contristent, si res nimio plus accisas deprehenderint. Vulnera autem, nisi explorentur, sanari nequeunt. Qui œconomica sua commode tractare non possunt, iis relinquitur, ut quos adhibent ministros, et caute eligant, et subinde mutent: novi enim minus audent, minusque astuti sunt. Cui raro rationes suas inspicere datur, eum, quæ computationi subjacent, in certos reditus atque etiam sumptus, vertere convenit. Qui impendiosior est in uno sumptus genere, eum sobrie parcum, et frugi oportet esse in alio: exempli gratia; si victu abundantior, vestium elegantia sit moderatior; si in aula sua copiosior, in equili contractior sit; et sic de similibus. Qui enim in singulis impensarum generibus est profusior, decoctionem fortunarum ægre vitabit. In perplexa et obærata re familiari liberanda, perinde sibi quis obesse poterit nimia festinatione, ac dilatione nimia: præpropræ enim venditiones, jacturam ex usuris, sæpe exæquant. Porro autem, qui simul et semel sortem asserit, de relapsu periclitatur: cum enim prætervectum tantas angustias se sentiat, ad ingenium redibit: qui autem se per gradus extricaverit, habitum frugalitatis inducit; eademque opera tam animo, quam fortunis, medetur. Sane qui res collapsas restituere in votis habet, vel minima quæque non spernat: atque plerunque minus sordidum est, sumptus quamvis minutos præcidere, quam

minutis lucris se submittere. Caute admodum inchoandi sunt sumptus, qui semel inchoati permansuri sint. Sed in sumptibus, qui non facile redeunt, splendidiorem et magnificentiorum esse licebet.

XXIX. DE PROFERENDIS FINIBUS IMPERII.

Dictum Themistoclis, sibi ipsi applicatum, incivile certe fuit, et inflatum; sin de aliis, atque in genere, prolatum fuisset, prudentem sane observationem, et pergravem censuram complecti videtur. Rogatus in convivio, ut cytharam pulsaret, respondit; "Fidibus se nescire; cæterum posse oppidum parvum in magnam civitatem evehere." Ista certe verba, ad sensum politicum translata, facultates duas, multum inter se discrepantes, in iis qui rerum gubernacula tractant, optime describunt, et distinguunt. Etenim, si regnum consiliarios, senatores, aliosque ad negotia publica admotos, qui usquam fuerunt, attente intueamur; reperientur profecto (licet rarissime,) nonnulli, qui regnum aut civitatem, e parvis ampla efficere possint, fidicines tamen sint valde imperiti: econtra autem, alii quamplurimi, in cythara, aut lyra, (hoc est aulicis tricis,) miri artifices, qui, tantum abest, ut rempublicam amplificare possint, ut potius a natura comparati videantur, ad statum reipublicæ beatum et florentum, labefactandum, et evertendum. Sane, artes illæ degeneres, et præstigiæ, quibus sæpenumero consiliarii, atque rerum potentes, et gratiam apud principes suos, et famam in vulgus, reportant, haud aliud nomen merentur, quam peritiæ cujusdam fidiculariæ; utpote, cum sint res, magis gratæ in præsens, et artificibus ipsis ornamento, quam ad rerumpublicarum, quarum sunt ministri, opes et amplitudinem, utiles, aut accommodæ. Occurrent proculdubio et alii consiliarii, atque reipublicæ gubernatores, minime spernendi, qui sint negotiis pares, possintque res commode administrare, easque a manifestis præcipitiis, et incommodis conservare; a virtute tamen illa rerumpublicarum erectrice et amplificatrice, longo intervallo absunt.

Verum qualescunque demum fuerint operarii, conjiciamus oculos in opus ipsum; qualis nimirum censeri debeat vera regnorum et rerumpublicarum magnitudo, et quibus artibus obtineri possit: dignum profecto argumentum, quod principes perpetuo in manibus habeant, et diligenter

meditentur; quo nec vires suas in majus æstimantes, incœptis, se vanis et nimis arduis implicent; nec rursus easdem plus æquo despicientes, ad consilia pusillanima et meticulosa, se demittant.

Magnitudo imperiorum, quoad molem et territorium, mensuræ subjicitur; quoad reditus, calculis. Numerus civium, et capita, censu; urbium et oppidorum amplitudo, tabulis excipi possint. Attamen non reperitur inter civilia, res errori magis obnoxia, quam verum et intrinsecum excipere valorem, circa vires et copias imperii alicujus. Assimilatur regnum cœlorum non glandi, aut nuci alicui grandiori, sed grano sinapis, quod inter grana est minimum; quod tamen habeat interim, intra se, proprietatem quandam, et spiritum innatum, quo se et citius attollat, et latius diffundat: eodem modo, invenire est regna et status, ambitu quidem et regionum tractu, valde ampla; quæ tamen ad fines ulterius proferendos, aut latius imperandum, sunt minus apta; alia contra, dimensione satis exigua, quæ tamen bases, in quibus maximæ monarchiæ inædificentur esse possint.

Urbes munitæ, plena armamentaria, equorum propagines generosæ, currus armati, elephanti, machinæ atque tormenta bellica omnigena, et similia; sunt certe ista universa nihil aliud, quam ovis induta pelle leonina; nisi gens ipsa, stirpe sua, et ingenio, sit fortis, et militaris. Imo, nec numerus ipse copiarum multum juvat, ubi milites imbelles sunt, et ignavi. Recte enim Virgilius; "Lupus numerum pecorum non curat." Exercitus Persarum, in campis Arbelæ, oculis Macedonum, tanquam vastum hominum pelagus, subjiciebatur; adeo ut duces Alexandri, nonnihil ipso spectaculo perculsi, regem interpellarent, atque ut noctu prælium committeret, ei auctores erant: quibus ille; "Nolo (inquit) suffurari victoriam." Ea autem etiam opinione fuit facilior. Tigranes Armenius, castrametatus in quodam colle, cum exercitu quadringentorum millium, cum spectaret aciem Romanorum, quæ quatuordecim millia non excessit, contra se tendentem, in scommate illo suo sibi complacuit; "Ecce, (inquit,) hominum, pro legatione, nimio plus quam oportet, pro pugna, longe minus." Eosdem tamen, priusquam occubuisset sol, satis multos, ad illum infinita strage profligandum, expertus est. Innumera sunt exempla, quam sit multitudinis cum fortitudine, congressus impar. Primo igitur, pro re certissima et exploratissima decernatur, et statuatur; quod caput omnium, quæ ad magnitudinem regni aut status spectent, sit, ut populus

ipse sit stirpe et ingenio bellicosus. Atque illud magis tritum, quam verum, quod nervi belli sint pecuniæ; si desint nervi lacertorum in gente molli et effœminata. Recte enim Cræso ostentanti aurum respondit Solon; "At si quis, (o rex) venerit, qui melius quam tu ferrum gestet, illi profecto totum hoc cedet aurum." Quare, quicunque is tandem sit princeps aut status, cujus subditi nativi et indigenæ, non sint animosi et militares, potentiam suam admodum sobrie æstimet: atque econtra, principes, qui dominantur in gentes animosas et martias, norint illi satis vires suas, si sibi alias non desint. Quod attinet ad copias mercenarias, (quod solet adhiberi remedium, cum copiæ nativæ desint,) plena sunt omnia exemplis; quibus liquido patet, quod quicunque status illis innitetur, poterit fortasse pennas ad tempus breve, nido majores extendere, sed defluent illæ paulo post.

Benedictio Judæ, et Issacharis, in unum nunquam convenient; nimirum, ut eadem tribus aut gens, sit simul, et "leonis catulus, et asinus procumbens inter sarcinas." Neque unquam fiet, ut populus tributis oppressus, fortis existat, et bellicosus. Verum est, collationes publico consensu factas, minus animos subditorum dejicere, et deprimere, quam quæ ex imperio mero indicuntur. Id quod liquido videre est, in tributis Germaniæ inferioris, quas Excisas vocant; atque, aliqua ex parte, in iis, quæ Subsidia nominantur apud Anglos. Etenim notandum est, sermonem jam institui, de animis hominum, non de opibus. Tributa autem, quæ ex consensu conferuntur, et quæ ex imperio imponuntur, etsi eadem res sint, quoad opes exhauriendas, varie tamen omnino animos subditorum afficiunt. Statuatur igitur et hoc, populum tributis gravatum, idoneum ad imperandum, non esse.

Aspirantibus ad magnitudinem regnis et statibus, prorsus cavendum, ne nobiles et patricii, atque (quos vocamus) generosi, majorem in modum multiplicentur. Hoc enim eo rem deducit, ut plebs regni sit humilis et abjecta; et nihil aliud fere quam nobilium mancipia et operarii. Simile quiddam fieri videmus in silvis cæduis; in quibus, si major, quam par est, caudicum, sive arborum majorum relinquatur numerus, non renascetur silva sincera et pura; sed major pars in vepres et dumos degenerabit: eodem modo, in nationibus, ubi numerosior justo est nobilitas, erit plebs vilis et ignava; atque eo demum res redibit, ut nec centesimum quodque caput, sit, ad galeam portandam, idoneum: præsertim si peditatum spectes; qui exercitus plerunque

est robur præcipuum; unde succedet magna populatio, vires exiguæ. Nusquam gentium, hoc quod dico, luculentius comprobatum est, quam exemplis Angliæ et Galliæ; quarum Auglia, quamvis territorio, et numero incolarum, longe inferior, potiores tamen partes fere semper in bellis obtinuit; hanc ipsam ob causam, quod apud Anglos coloni, et inferioris ordinis homines, militiæ habiles sint, rustici Galliæ non item. Qua in re, mirabili quadam et profunda prudentia excogitatum est, ab Henrico septimo Angliæ rege (id quod in Vitæ ejus historia fusius tractavimus,) ut prædia minora, atque domus agricolationis, instituerentur, quæ habeant certum, eumque mediocrem agri modum annexum, qui distrahi non possit: eo fine, ut ad victum liberaliorem sufficiat; utque agricultura ab iis exerceretur, qui domini fuerint fundi, aut saltem usufructuarii, non conductitii, aut mercenarii. Nam ita demum characterem illum, quo antiquam Italiam insignivit virgilius, merebitur regio aliqua;

— Terra potens armis, atque ubere glebæ.

Neque prætereunda est illa pars populi, (quæ Angliæ fere est peculiaris, nec alibi (quod scio) in usu, nisi forte apud polonos,) famuli scilicet nobilium: hujus enim generis etiam inferiores, quoad peditatum, agricolis ipsis minime cedunt. Quare certissimum est, quod magnificentia, et splendor ille hospitalis, atque, famulitia, et veluti satellitia ampla, quæ in more sunt apud nobiles, et generosos, in anglia, ad potentiam militarem apprime conducant; ubi contra, nobilium obscura, et magis privata, et in se reducta vitæ ratio, copias militares minuit.

Danda est omnino opera, ut arbor ista monarchiæ, qualis fuit Nebuchadnezzaris, truncum habeat satis amplum, et robustum, ad ramos suos et frondes sustentandos: hoc est, ut numerus indigenarum, ad subditos extraneos cohibendos, satis superque sufficiat. Illi igitur status, ad imperii magtitudinem bene comparati sunt, qui jus civitatis facile et libenter largiuntur. Vana siquidem fuerit opinio, posse manipulum hominum, utcunque animis et consilio excellant, regiones nimio plus amplas et spatiosas, imperii jugo cohibere et frœnare. Id ad tempas fortasse facere possint, sed diuturnitatem hæc res non assequitur. Spartani parci fuerunt et difficiles in cooptandis novis civibus. Unde donec intra parvos limites dominati sunt, res eorum firmæ fuerunt, et stabiles; at postquam limites suos cœpissent proferre, et latius dominari, quam ut stirps Spartanorum,

turbam exterorum, imperio commode coercere posset, potentia eorum corruit. Nulla unquam respublica sinus suos, ad novos cives recipiendos, tam profuse laxavit, quam respublica Romana. Itaque par erat, instituto tam prudenti, fortuna; cum in imperium toto orbe amplissimum succreverint. Moris apud eos erat, jus civitatis prompte elargiri; idque in supremo gradu: hoc est, non solum jus commercii, jus connubii, jus hæreditatis; verumetiam jus suffragii, et jus petitionis sive honorum: hocque rursus, non singulis tantum personis, sed totis familiis, imo civitatibus, et nonnunquam integris nationibus communicarunt. Huc adde consuetudinem deducendi colonias, quibus Romanæ stirpes in solum exterum transplantabantur. Quæ duo instituta, si simul componas, dices profecto, non Romanos se diffudisse super universum orbem; sed contra, orbem universum se diffudisse super Romanos: quæ securissima proferendi imperii est ratio. Subit mirari sæpius imperium Hispanorum, quod tam paucis indigenis, tot regna et provincias amplexari et frœnare possit. At certe, Hispaniæ ipsæ, pro arboris stemmate satis grandi haberi debent; cum longe ampliorem contineant regionum tractum, quam Romæ aut Spartæ, sub initiis suis, contigerat. Porro, quanquam jus civitatis, satis parce soleant Hispani impertire, quod proximum tamen est, faciunt; quippe, qui cujuscunque nationis homines, ad militiam suam ordinariam, promiscue admittant. Quinetiam, summum belli imperium, haud raro, ad duces, natione non Hispanos, deferunt. Attamen, et illam ipsam, videntur, non ita pridem, indigenarum paucitatem sensisse, eique succurrere cupiisse; ut ex pragmatica sanctione, hoc anno promulgata, cernere est.

Certissimum est, artes mechanicas sedentarias, quæ non sub dio, sed sub tecto exercentur; atque manufacturas delicatas, que digitum potius quam brachium requirunt: sua natura, militaribus animis esse contrarias. In universum, populi bellicosi feriari gaudent, et pericula quam labores minus exhorrent, Atque in hoc ingenio suo, non sunt admodum reprimendi, si animos ipsorum in vigore conservare, cordi nobis sit. Magno itaque adjumento, Spartæ, Athenis, Romæ, aliisque, antiquis rebuspublicis fuit, quod habuerint non ingenuos, sed servos plerunque, quorum laboribus istiusmodi opificia expediebantur. Verum mancipiorum usus, post legem Christianam receptam, maxima ex parte, abiit in desuetudinem. Huic vero rei proximum est, ut artes istæ alienigenis tantum permit-

tantur; qui propterea alliciendi, aut saltem facile recipiendi sunt. Nativorum autem plebs ex tribus generibus hominum constare debet; nempe ex agricolis; famulis ingenuis; et artificibus, quorum opera robur et lacertos viriles postulant: cujusmodi sunt fabri ferrarii, lapidarii, lignarii, et similes; non annumerando militiam descriptam.

Ante omnia, ad imperii magnitudinem confert, ut gens aliqua armorum studium profiteatur, tanquam decus suum, et institutum vitæ primarium, et in præcipuo honore habitum. Quæ enim a nobis adhuc dicta sunt, ad habilitates tantum erga arma spectant; quorsum autem habilitas, si non rei ipsi incumbitur, ut producatur in actum? Romulus (ut narrant, aut fingunt,) postquam e vivis excesserat, illud civibus suis legavit, ut ante omnia rem militarem colerent, unde in caput orbis terrarum urbs eorum insurgeret: imperii Spartani fabrica universa, (non nimis prudenter quidem, sed diligenter tamen,) ad illum finem et scopum, composita est et constructa, ut cives sui belligeratores essent. Persarum, et Macedonum, idem erat institutum, sed non tam constans aut diuturnum. Britanni, Galli, Germani, Gothi, Saxones, Normanni, et nonnulli alii, etiam ad tempus armis se præcipue dediderunt. Turcæ idem institutum, lege sua paululum extimulati, hodie retinent, sed magna cum militiæ suæ, (ut nunc est,) declinatione. In Europa Christiana, gens quæ illud adhuc retinet et profitetur, soli sunt Hispani. Verum res est, tam liquida, et manifesta, unumquemque in eo proficere maxime, in quo plurimum impendit studii, ut verbis non indigeat. Satis fit innuisse, desperandum omnino alicui nationi esse, quæ non ex professo arma et militiam colat, iisque precipue studeat et incumbat, sibi veluti ultro obventuram, insignem aliquam imperii magnitudinem: contra autem, certissimum esse temporis oraculum, nationes illas, quæ in armorum professione et studiis diutius permanserint: (id quod Romani, Turcæque, potissimum fecere;) miros in imperio amplificando facere progressus. Quin et illæ, quæ bellica gloria, per unius tantummodo secuti spatium floruere; inde tamen, unico illo seculo, eam imperii amplitudinem assecutæ sunt, quam longo post tempore, etiam remissa illa armorum disciplina, retinuerunt.

Præcepto præcedenti affine est; ut status quis utatur ejusmodi legibus, et consuetudinibus, quæ justas illi causas, aut saltem prætextus, arma capescendi, tanquam in promptu ministrent. Etenim, ea est insita animis homi-

num justitiæ apprehensio, ut bellum, (quod tot sequuntur calamitates,) nisi gravem ob causam, saltem speciosam, inferre abstineant. Turcis præsto est semper, et ad nutum, belli causa; propagatio scilicet legis et sectæ suæ. Romani, quanquam pro magno decore imperatoribus apud eos fuerit, si fines imperii ipsorum protulissent, tamen ob hanc causam, ut fines proferentur, nunquam bella susceperunt. Aspiranti igitur ad imperium nationi, illud in more sit; ut sensum habeat vividum et acrem, injuriæ alicujus; vel subditis suis limitaneis, vel mercatoribus, vel publicis ministris, illatæ; neque a prima provocatione diutius torpeat, aut tardet. Item, prompta sit, et alacris, ad auxilia mittenda sociis suis, et fœderatis: id quod perpetuum erat apud Romanos: adeo ut, si forte in populum fœderatum, cui etiam cum aliis fœdus defensivum intercederet, hostilis impressio facta esset; atque ille a plurimis suppetias peteret; Romani omnium primi semper adessent, beneficii decus, nemini præripiendum relinquentes. Quod vero attinet ad bella, antiquis temporibus, propter statuum conformitatem quandam, aut correspondentiam tacitam, gesta, non video in quo jure illa fundata sint. Talia fuerunt bella, quæ a Romanis, suscepta erant, ad Græciam in libertatem vindicandam; talia a Lacedæmoniis et Atheniensibus, ad constituendas, aut evertendas democratias, et oligarchias: talia quandoque illata sunt, a rebuspublicis aut principibus, sub prætextu, subditos alienos protegendi, et a tyrannide liberandi. Ad rem præsentem sufficiat, ut illud decernatur; non esse expectandam, statui alicui, imperii amplitudinem, nisi ad quamvis occasionem justam se armandi, protinus expergiscatur.

Nullum omnino corpus, sive sit illud naturale, sive politicum, absque exercitatione, sanitatem suam tueri queat. Regno autem, aut reipublicæ justum, atque honorificum bellum loco salubris exercitationis est. Bellum civile profecto instar caloris febrilis est; at bellum externum instar caloris ex motu, qui valetudini imprimis conducit. Ex pace enim deside atque torpente, et emolliuntur animi, et corumpuntur mores. Sed utcunque res se habeat, quatenus ad alicujus status felicitatem, magnitudinis procul-dubio interest, ut quasi semper in armis sit. Atque exercitus veteranus, perpetuo tanquam sub vexillis habitus, et si res sit, magni procul-dubio sumptus et impensæ; attamen ejusmodi est, ut statui alicui, quasi arbitrium rerum inter vicinos, aut saltem plurimum existimationis ad omnia, conferat Id quod insigniter cernere est in Hispanis, qui jam

per annos centum et viginti, exercitum veteranum, ad aliquas partes, licet non semper ad easdem, aluerunt.

Maris dominium, monarchiæ quædam epitome est. Cicero, de Pompeii contra Cæsarem apparatu, scribens ad Atticum: "Consilium (inquit) Pompeii, plane Themistocleum est; putat enim, qui mari potitur, eum rerum potiri." Atque Cæsarem Pompeius, proculdubio delassasset, et attrivisset, nisi inani fiducia inflatus, ab illo incepto destitisset. Prælia navalia, quanti fuerint momenti, ex multis exemplis patet. Pugna ad actium, orbis imperium determinavit. Pugna ad insulas cursolares, circulum in naribus Turcæ posuit. Multoties certe evenit, ut victoriæ navales, finem summæ belli attulerint; sed hoc factum est, cum aleæ hujusmodi præliorum, totius belli fortuna commissa est. Illud minime dubium, quod qui maris potitur dominio, in magna libertate agit, et tantum, quantum velit, de bello sumere potest: ubi contra, qui terrestribus copiis est superior, nihilominus plurimis angustiis conflictatur. At hodie, atque apud nos Europæos, si unquam, aut uspiam, potentia navalis, (quæ quidem huic regno Britanniæ in dotem cessit,) summi, ad rerum fastigia, momenti est; tum quia pleraque Europæ regna mediterranea simpliciter non sunt, sed maxima ex parte mari cincta; tum etiam, quia utriusque Indiæ thesauri et opes, imperio maris, veluti accessorium quiddam, existunt.

Bella moderna, veluti in tenebris gesta, censeri possunt, præ gloria et decore vario, quæ in homines militares, priscis temporibus, a rebus bellicis, resilire solebant. Habemus hodie, fortasse ad animos faciendos, ordines quosdam honorificos militiæ; qui tamen jam facti sunt armis et togæ communes: etiam in scutis gentilitiis, stemmata nonnulla habemus: insuper, hospitia quædam publica, militibus emeritis et mutilatis destinata, et hujusmodi. Verum, apud veteres, in locis, ubi victoriæ partæ sunt, extructa trophæa; laudationes funebres; monumenta magnifica occumbentium in bello; coronæ civicæ; militares, singulis concessæ; nomen ipsum imperatoris, quod postea reges maximi a belli ducibus mutuati sunt; redeuntium ducum, bellis prospere confectis, celebres triumphi; donativa atque largitiones ingentes in milites, sub exercituum dimissionem: hæc (inquam) tot et tanta fuerunt, et tam insigni splendore coruscantia, ut pectoribus mortalium, etiam maxime conglaciatis, igniculos subdere, eaque ad bellum inflamare potuerint. Ante omnia vero, mos ille triumphandi, apud Romanos, non res erat ex pompa, aut spectaculum quod-

dam inane, sed inter prudentissima plane nobilissimaque instituta, numerandus: utpote, qui in se hæc tria haberet; ducum decus et gloriam; aerarii ex spoliis locupletationem; et donativa militum. Verum honor triumphi, fortasse monarchiis non competit, præterquam in personis regum ipsorum, aut filiorum regum; quod etiam, temporibus imperatorum, Romæ obtinuit: qui honorem ipsum triumphi, sibi et filiis suis, de bellis, quæ præsentes ipsi confecerant, tanquam peculiarem reservarunt: vestimenta autem solummodo, et insignia triumphalia, aliis ducibus indulserunt.

Verum, ut sermones hos claudamus; nemo est, (ut testatur sacra Scriptura, "qui sollicite cogitando, potest apponere ad staturam suam, cubitum unum;" in pusillo scilicet corporis humani modulo: cæterum in magna regnorum et rerumpublicarum fabrica, imperium amplificare, et fines proferre, reges penes et dominantes est. Nam prudenter introducendo leges, instituta, et consuetudines, quales jam proposuimus, et alias his similes, posteris, et seculis futuris, magnitudinis sementem fecerunt. Verum ista consilia apud principes raro tractantur, sed res fortunæ plerunque committitur.

XXX. DE REGIMINE VALETUDINIS.

In regimine valetudinis, invenire est quandam prudentiam, ultra regulas medicinæ: observatio cujusque propria, eorum quæ nocent, eorum quæ juvant, optima est medicina ad sanitatem tuendam. Verum tutius est concludere: "Hoc sensi mihi nocuisse, ergo eo non utar;" quam isto modo: "Hoc quod sensi, minime offendit, ergo eo uti licet." Etenim vigor juventutis, excessus plurimos tegit, qui tamen in senectute tandem velut debita exigentur. Considera aetatem ingruentem, neque confide eadem perpetuo continuare: non enim bellum indicendum senectuti. Cave a subita aliqua mutatione, in regiminis parte quapiam principali; quod si necessitas urgeat, cætera ad eam mutationem accommoda. Secretum enim est, et naturale, et politicum; "Tutius est, multa mutare quam unum magnum." Examini tamen subjicias consuetudines tuas; diætæ, somni, exercitationis, vestium, mansionis, et similium: et, si quid nocumento esse judices, experire illud paulatim exuere; ita tamen, ut si ex mutatione nocumenti aliquid perceperis, ad consueta redeas: difficile enim distinguere inter ea,

quæ toto genere sunt salubria, et ea quæ corporis tui unici constitutioni conveniunt. Vacuo animo esse, et hilari, ad horas cibi, somni, et exercitationis, est ex optimis præceptis, ad prolongandam vitam. Quatenus ad animi passiones, et studia; devita invidiam; metus anxios; iram intus cohibitam; subtiles et nodosas disquisitiones; gaudia, et exhilarationes immodicas; tristitiam alte pressam; et non communicatam. Amplectere spes; lætitiam potius quam gaudium; delectationum varietatem magis quam satietatem; admirationem, et propterea novitates; studia quæ animum replent splendidis et illustribus objectis; veluti, historias, fabulas, peragrationes naturæ. Medicationem si omnino fugias, valetudine utens bona, corpori ingratior accedet, cum necessitas ingruerit. Eidem si nimium assuescas, detrahet de viribus et efficacia ejus, quando morbus advenerit. Probo potius diætas quasdam, ad certa tempora, quam usum medicamentorum frequentem; nisi jampridem transierit in consuetudinem. Diætæ enim hujusmodi, alterant corpus magis, perturbant minus. Ne contemnas accidens aliquod in corpore tuo novum et insuetum, sed consilium medicorum circa illud adhibe. Dum ægrotas, valetudinem tuam cura maxime; dum vales, corpore tuo utere, nec sis nimis delicatus: qui enim, dum valet, corpori tolerantiam imperat; in morbis compluribus, qui scilicet non sunt acuti; diæta sola, et corporis regimine paulo exquisitiore, curari possit absque multa medicatione. Celsus monitum illud suum, nunquam parturiisset ut medicus, nisi una fuisset vir prudens. In præceptis dat, tanquam arcanum tuendæ valetudinis, et prolongandæ vitæ; ut quis contraria alternet, et subinde mutet, sed cum inclinatione in extremum benignius. Nempe, victu utere parciore, et pleniore, sed pleniore sæpius; vigiliis, et somno largiori insuescas, sed somno magis: quietem, et motum sive exercitium repetas, sed frequentius motum; et similia. Ita enim natura simul et fovebitur, et robur acquiret. Ex medicis aliqui, erga ægrum, et ejus desideria, tam sunt indulgentes, ut morbi curam legitimam non urgeant; alii contra, tam regulares et rigidi, in procedendo secundum artem, circa curam morbi, ut ægri conditionem et naturam, non satis respiciant: medicum elige temperaturæ mediæ: vel si hoc ad votum, in uno aliquo medico, non cesserit, adhibe ex utroque genere unum: atque memor sis advocare medicum, corporis tui gnarum, non minus quam in arte sua spectatum.

XXXI. DE SUSPICIONE.

Suspiciones inter cogitationes, sunt ut inter aves vespertiliones: nunquam volitant, nisi luce crepera. Reprimendæ certe sunt, aut saltem caute custodiendæ: mentem enim obnubilant; amicos alienant; et negotia interpellant; ita ut nec alacriter, nec constanter, peragi possint. Reges inclinant ad tyrannidem; maritos ad zelotypiam; etiam prudentes ad animi vacillationem, et melancholiam. Sunt autem suspiciones, defectus, non tam cordis, quam cerebri: locum enim reperiunt, etiam in fortissimis animis: exemplo esse poterit Henricus Septimus, rex Angliæ: quo non fuit alter suspicacior, nectamen animosior. In ejusmodi vero temperatura, minus nocent: plerunque enim non admittuntur, nisi prius discutiantur, utrum probabiles sint, annon? Utrum in meticulosis ingeniis, nimio plus prævalent. Nihil certe æque facit hominem multa suspicari, ac parum scire. Itaque rectissime adhibetur remedium, ad suspiciones, ut quis inquisitionem urgeat. Fumo enim et tenebris aluntur suspiciones. Quid sibi tandem volunt homines? Existimantne cunctos, quorum opera utuntur, et quibuscum versantur, angelos esse, aut sanctos? Nesciuntne illos, ad suos proprios fines, aspirare; et unumquemque proximiorem esse sibi, quam alteri? Nullus itaque est modus, moderandis suspicionibus aptior, quam remedia parare, ac si suspiciones essent veræ, iis vero frœna injicere, ac si essent falsæ. Eatenus enim suspiciones usui esse poterint, ut ita nos comparemus, quod quamvis verum foret, quod suspicamur, nocere tamem non possit. Suspiciones, quas ex se mens colligit, sunt nisi inanes bombi: quæ vero externo artificio aluntur, animisque; hominum instillantur, susurronum et famigeratorum sermonibus, aculeos habent. Optima certe ratio, expediendi nos, ex impedita hac suspicionum sylva, est libera quædam et aperta illarum declaratio, apud eos, quos suspectos habemus: hinc enim fieri non potest, quin plus cognoscamus, utrum veræ sint, necne, quam antea. Hoc simul reddet eum, quem suspectum habemus, cautum magis et circumspectum, ne novam præbeat suspicionis ansam. Sed hoc fieri non oportet, cum hominibus pravæ indolis, et degeneris: hi enim, ubi semel se suspectos sentiant, fideles postmodum nunquam evadent. Diverbium habetur apud Italos, "Sospetto licentia fede." Quasi suspicio fidei missionem daret: cum potius fidem accendere deberet, ut seipsam liberaret.

XXXII. DE DISCURSU SERMONUM.

Sunt qui in sermonibus, affectant potius ingenii laudem, qua in quamcunque partem disputare possint, quam judicii, in veritate enucleanda: ac si laudabile esset, invenire quid dici possit, non quid teneri debeat. Sunt qui in promptu habent, locos aliquos communes, et themata, in quibus luxuriantur, cætera steriles et jejuni; quod penuriæ genus plerunque tædio afficit, et quamprimum notam subierit, in ridiculum evadit. Pars sermonis honoratior, hæc est; ansam sermonis præbere; et rursus eidem moderari, ac ad alia transire; tunc enim quis choream ducit. Bonum sane, in conversatione et colloquiis familiaribus, subinde variare; et sermones circa res præsentes cum disputationibus; narrationes cum argumentis; quæstiones cum positivis; jocosa cum seriis, immiscere: satietatem siquidem et fastidium parit, in aliquo subjecto diutius hærere. Quantum ad jocos; sunt quædam, quæ a joco, veluti privilegio, eximi debent; religio, negotia reipublicæ, personæ sublimes, privatorum negotia majoris momenti, denique casus omnis miserabilis. Nonnullos tamen reperies, quibus ingenia sua obdormiscere videbuntur, nisi acutum aliquem et mordacem sarcasmum in quempiam contorserint. Ille habitus omnino coercendus:

Parce puer stimulis, et fortius utere loris.

In summa, discrimen servandum, inter salsa, et amara. Certe, qui satyricam amplectitur venam, sicut aliis metum injicit ab ingenio suo, ita ab aliorum memoria metuere debet. Qui interrogat multum, et addiscet multa, et placebit in multis; præsertim si quæstiones suas, ad captum et peritiam respondentis, adaptet; siquidem occasionem ei præbebit scientiam suam ostentandi; ipse autem novis continuo scientiæ augmentis dotabitur. Molestæ autem ne sint quæstiones; id examinatori convenit. Etiam qui sermonis familiaris dignitatem tueri cupit, aliis vices loquendi relinquat. Quin et, si qui adsint, qui dominari in sermonibus, et tempus universum occupare studeant, illos arte quadam abrumpere sciat, et alios ad loquendum inducere; sicut tibicines moderari solent saltantibus. Scientiam si quandoque dissimules, eorum quæ scire existimaris, putaberis alias ea scire, quæ nescis. Sermo alicujus de seipso, rarus esse debet, et cum judicio. Novi quen-

dam, cui sæpe in ore erat, per ironiam: "Oportet hunc egregie sapientem esse, ita multa de seipso liquitur." Vix occurrit casus aliquis, in quo se laudare quis decore possit, præter unum: is est, si virtutem alterius laudet; sed eam intelligo virtutem, ad quam ipse aspirat. Sermo alios pungens et vellicans, parce utendus: etenim sermones familiares debent esse instar campi aperti, in quo spatiari licet; non viæ regiæ, quæ deducit domum. Noveram nobiles duos, ad partem Angliæ occidentalem; quorum alter scommatibus nimio plus indulgebat, sed hospitalis admodum erat. Alter autem quærere solebat, a convivis illius prioris: "Dic sodes; annon scomma aliquod intercesserat, in quempiam jactum?" Cui conviva forte: "Tale aliquid contigit." At ille, utpote alterius Æmulus: "Satis sciebam, eum prandium bonum malis condimentis corrupturum." Sermo cum discretione præstat eloquentiæ; et apte loqui, et accommodate, ad personam cum qua colloquimur, efficacius est, quam ornamenta verborum, aut methodi, captare. Continuata oratio bona, absque interlocutione bona, tarditatem monstrat: at replicatio, et interlocutio bona, absque facultate orationem continuandi, penuriam, et scientiam minime fundatam, prodit: quemadmodum in animalibus videmus, quæ cursu minus valent, flexu maxime agilia esse: ut fit inter leporarium, et leporem. Circumstantiis nimio pluribus, orationem vestire, antequam rem ipsam attingas, tædium parit; iisdem penitus carere, abruptum quiddam est, et ingratum.

XXXIII. DE PLANTATIONIBUS POPULORUM, ET COLONIIS.

Coloniæ eminent inter antiqua et heroica opera. Mundus, cum adhuc juvenis esset, plures progenuit liberos; nunc senex factus, pauciores. Etenim, non immerito colonias novas, tanquam liberos nationum antiquiorum, duxerim. Plantationem populorum probo in solo puro: intelligo, ubi populus non destruitur, ut populus inseratur: hoc enim cum fit, extirpatio prorsus est, non plantatio. Plantatio regionum non absimilis est plantationi sylvarum: in quibus de utilitate capienda nihil cogitandum ante annum vicesimum: verum fructus uber et locuples, in fine operis, expectandus. Illud certe, quod præcipue colonias, alias bene successuras, evertit, fuit, sordida illa et avida lucri captatio, sub initiis coloniarum. Verum est, lucri

segetem acceleratam, non negligendam, modo cum bono coloniæ conjuncta sit, sed non ultra. Indignum quiddam et infaustum est, cum fæx populi, exules, et damnati, in coloniæ seminarium sumuntur. Quin et coloniam ipsam corrumpit et perdit. Hujusmodi enim homines profligati instar erronum degent; nec operi accingent, sed otio se dedent; quin et scelera perpetrabunt, fruges consument, et coloniæ fastidio afficientur: ac tum demum, nuncios et literas in patriam mittent, in plantationis præjudicium et dedecus. Populus, qui in coloniam sumatur, præcipue sint artifices generum sequentium: hortulani, aratores, fossores, fabri ferrarii, fabri lignarii, piscatores, aucupes, chirurgi, pharmacopolæ, coci, pistores, cervisiarii, et hujusmodi. In regione, ubi plantare instituis, circumspice primo, quod genus esculentorum et poculentorum, terra ex sese, sine cultura, edat: veluti castaneas, juglandes, nuces pinus, olivas, dactylos, pruna, cerasa, mel silvestre, et similia; atque illis, ut par est, utere. Dein disquire, quod genus victualiorum, solum proferre possit celeriter, intra annum: veluti pastinacas, caricas, brassicas, cepas, raphanos, melones, pepones, cucumeres, artiplices de Hierusalem, maiz, et alia. Quantum ad triticum, siliquam, hordeum, et avenam, nimiam grana hæc poscunt culturam: attamen a fabis et pisis etiam inchoare licet: tum quia minore opera indigent; tum quia non minus cibi loco, quam panis, inserviunt. Etiam ab oriza multiplex provenit seges; quæ et cibi quoque copiam facit. Ante omnia, magna copia transportanda, panis biscocti, farinæ ex avena, pollinis, farinæ omnigenæ, et similium, ut sub initiis præsto sint, donec panis confici possit. Pecudes, et aves, delige eas, quæ a morbis præcipue immunes sunt, et præ cæteris prolificæ: quales sunt porci, capræ, galinæ, galinæ Indicæ, anseres, columbæ domesticæ, cuniculi, et similes. Præcipio autem piscationibus incumbendum, tum ad sustentationem coloniæ, tum ad lucrum exportationis. Commeatus in coloniis adeo parca manu fere distribuendus, ac si in oppidis obsessis esset; hoc est, pro rata. Maxima autem pars soli, quod in hortos aut segetes convertitur, horreis publicis assignetur; in quibus fruges reponantur, et mensura certa distribuantur: ita tamen ut supersint nonnullæ fundi portiones, in quibus industria singulorum se exerceat. Circumspice insuper, quas merces nativas regio illa producat, ut exportatio earum, in loca ubi maxime in pretio sunt, sumptus levet; ut usuvenit in nicotiano apud Virginiam; modo non sit, (ut jam dic-

tum,) in præjudicium intempestivum coloniæ ipsius. Sylvæ in regionibus desertis, ut plurimum, abundant; itaque ligna, ad ædificia, naves, aut ejusmodi usus apta, inter præcipuas merces numeranda. Si inveniatur vena ferri, et rivuli ad molendina ferraria idonei, ferrum e mercibus quæstuosis est, in regionibus sylvosis. Salis nigri confectio per calorem solis, si clima ferat, digna res est quæ tentetur. Etiam sericum vegetabile, si adsit, merx est lucrosa. Pix cujuscunque generis, ubi proveniunt pinus et abietes, semper præsto est. Quin et pharmaca, et ligna odorata, si reperiantur, haud parvum commodum præbent. Etiam cineres, quibus ad sapam utuntur, non modicum utilitatis afferent: similiter et alia quæ perquiri possunt. Verum fodinis ne confidas nimium, præsertim a principio. Fodinæ enim fallaces sunt, et sumptuosæ; et spe pulchra lactantes, colonos reddunt circa alia socordes. Regimen coloniæ committatur uni, cui tamen assideant consiliarii aliquot; atque muniantur auctoritate, ad exemplum juris militaris, sed aliquantulum restricta. Ante omnia, hunc sibi decerpant homines fructum, vivendo in eremo; ut Deum semper, ejusque cultum, præ oculis habeant. Rursus, colonia, a numerosiore concilio, (intelligo in regione, matre coloniæ, residente,) non pendeat; nec ob contributiones exiguas multitudini nimiæ subjiciatur; sed sit numerus eorum, qui negotia coloniæ procurant et ordinant, moderatus: sintque potius ex nobilibus, et generosis, quam mercatoribus; hi enim lucro præsenti plus satis inhiant. Sit plane immunitas a vectigalibus et portoriis, donec colonia adoleverit: neque tantum immunitas a solutionibus pecuniarum concedatur, sed etiam libertas merces in quascunque velint partes exportandi; nisi gravis aliqua causa obfuerit. Coloniam populo ne farcias aut superoneres, alios post alios mittendo: sed potius informationi diligenti intende, quot capita de tempore in tempus minuantur; eaque numero conveniente, pro rata, suppleas; ita tamen, ut coloni bene victitent, nec penuria affligantur. Magnum jampridem salubritati complurium coloniarum detrimentum intulit, ædificatio juxta mare et fluvios, in locis paludinosis et aquosis. Itaque, etsi ab hujusmodi locis incipiendum, propter vecturæ et aliarum rerum commoditatem, paulatim tamen in superiores regionis partes, et ab aquis remotiores, ascendendum. Interest etiam sanitatis coloniæ, ut salis sat bona copia convehatur; quo cibi, quos verisimile est putridos aliter sæpe futuros, condiantur. Si coloniam plantes, ubi barbari sedes suas habeant, neutiquam eos

nugis tantum, et tricis, concilies; sed justitia, et modis gratiosis, demerere; nihil tamen de præsidiis minuendo; quæ ad securitatem pertinent: neque etiam benevolentiam eorum aucupare, auxiliis contra hostes suos; sed auxiliis defensivis non incommodum erit subvenire. Interest etiam, aliquos ex indigenis, sæpe in regionem, unde colonia migravit, mittere; ubi videant conditiones hominum suis multo præstantiores; idque sub reditu, inter suos divulgent. Postquam colonia adoleverit, et robur acceperit, tempestivum erit mulieres summittere; ut colonia ex sese propagetur, nec semper ab externis pendeat. Super omnia flagitiosissimum est, coloniam semel deductam, deserere et destituere; præterquam enim quod de decori est, nil aliud est, quam proditio mera, profusioque sanguinis, complurium hominum miserorum.

XXXIV. DE DIVITIIS.

Divitias cognomine magis proprio vocare nequeam, quam ut eas appellem impedimenta virtutis. Sicut enim se habent impedimenta ad exercitum, ita divitiæ ad virtutem: necessariæ siquidem sunt, sed graves: quinetiam cura illarum victoriam sæpe disturbat. Divitiarum magnarum nullus est usus, præterquam in iis expendendis: cætera in opinione versantur. Idem dictat Solomon: "Ubi multæ sunt opes, multi qui comedunt eas; et, "quid prodest possessori, nisi quod cernat divitias oculis suis?" Possessio divitiarum, nulla voluptate dominum perfundit, quantum ad sensum: est sane custodia ipsarum; est etiam potestas donativi aut distributionis; est et fama, et inflatio ab ipsis; sed non datur solidus ipsarum usus, qui ad dominum pertingat. Annon vides ficta illa pretia, quibus gemmæ, et hujusmodi rariora, æstimantur; et quam inania opera suscipiantur, ad ostentationem meram, ut usus aliquis divitiarum magnarum videri possit? Sed dicet quispiam, usum earum vel in hoc maxime cerni posse; quod dominos ex periculis et calamitatibus redimant: ut ait Solomon: "Substantia divitis urbs roboris ejus, et quasi murus elevatus in imaginatione sua:" sed caute Solomon, quod imaginatione, non reipsa, tales sunt. Plures enim, sine controversia, divitiis suis magnis venerunt, quam redempti sunt. Divitias magnas ne secteris; sed quas parare possis juste, impendere sobrie, erogare hilariter, et libenter dimittere. Neque tamen con-

temptum ipsarum, instar monachi alicujus, aut a seculo abstracti, foveas; sed de usu distingue; sicut Cicero optime de Rabirio Posthumo; "In studio rei amplificandæ, apparebat, non avaritiæ prædam, sed instrumentum bonitati quæri." Ausculta etiam Solomoni, nec præpoperæ opum accumulationi inhia: "Qui festinat ad divitias, non erit insons." Fingunt poetæ, Plutum, (qui divitias sonat,) a Jove missum, claudicare, et tardigradum esse: a Plutone autem, currere, et pedibus celerem. Innuentes, divitias, bonis artibus, et justo labore, partas, tarde accedere; sed per mortem aliorem advenientes (veluti ex hæreditatibus, testamentis, aut similibus,) præcipitanter ruere. Nec minus poterit fabula ea de Plutone intelligi, si Plutonem pro diabolo accipias. Cum enim opes a diabolo fluunt, (veluti, per fraudes, oppressiones, injusticiam, et scelera,) rapido cursu feruntur.

Viæ ad ditescendum variæ, et pleræque earum fœdæ. Parsimonia inter optimas censeri possit, neque tamen ipsa omnino innocens est: opera enim liberalitatis et charitatis coarctat. Soli cultura, quasi ad divitias maxime genuina; utpote quæ benedictio magnæ matris Telluris sit; verum lenta est hæc via. Attamen ubi homines insigniter opulenti, se ad agriculturam, et lucra rustica, submittunt, divitias in immensum coacervant. Noveram ex proceribus Angliæ quendam, cui maximi reditus proveniebant, e re rustica, supra subditos cæteros quoscunque ætatis meæ. Dives erat armentis; ovibus; sylvis, tam cæduis, quam grandioribus; lithanthracibus; frumento; plumbi et ferrifodinis; et compluribus aliis proventibus rusticis. Adeo ut terra ei instar maris erat, merces perpetuo importans. Recte a quodam observatum; se magno cum labore ad exiguas, et nullo fere ad magnas divitias, pervenisse. Postquam enim res alicujus nummaria, sic increverit, ut nundinarum et mercatuum opportunitates præstolari possit; atque eos contractus superare, quibus ob summæ magnitudinem, perpauci admodum homines apti sunt; atque etiam in laboribus aliorum participare, qui minus pecunia abundant; fieri non potest, quin supra modum ditescat. Lucra ex professionibus, honesta certe sunt; et duabus rebus promoventur maxime; diligentia, et fama bona propter probitatem in negotiando. At lucra ex contractibus majoribus, plerunque naturæ magis ancipitis; cum quis scilicet aliorum necessitates et angustias obsideat; servos et ministros alienos in damnum dominorum corrumpat; emptores alios, qui in majora forte pretia con-

sensissent, artificiose et vafre summoveat; et hujusmodi fraudes exerceat; quæ omnes merito damnandæ sunt. Quantum vero ad emptiones, animo, non retinendi, sed rursus divendendi, illæ ex utraque fere parte molunt; tam venditorem, quam emptorem prementes. Societates locupletant affatim; si cautus adhibeatur delectus eorum, quibuscum societas initur. Fœnus ex certissimis lucri generibus est, licet ex pravissimis: utpote quod hominem panem suum comedere faciat, in sudore vultus alieni; atque in sabbatho operari non cessat. Attamen certum licet sit, non caret rimis suis secretis: siquidem notarii, et institores, ad commodum proprium, homines fortunarum debiarum, quandoque extollent. Primum esse in inventione aliqua nova, aut privilegio, inundationem quandam opum interdum largitur: sicut contigit primo sacchari excoctori in Canariis: itaque si quis se peritum dialecticum præstare possit, us addat inventioni judicium, magna haud dubie efficiet; præsertim si tempora sint propitia. Qui lucra tantummodo certa captat, ægre ad magnas divitias assurget: contra, qui totus in incertis est, vix fortunarum dispendia vitabit: bonum igitur fuerit incerta lucra certis munire, ut damnis subveniatur. Monopolia, et mercium coemptiones ad revenditionem, ubi lege nulla prohibentur, ad divitias viam sternunt facilem; præsertim si quis prospicere possit, quæ merces in æstimationem venturæ sint, atque eo modo se illis abunde instruat. Opum acquisitio, per servitium regum, aut magnatum, dignitatem quandam habet; tamen si assentationibus, et servilibus artificiis, sese ad omnes nutus flectendo, parentur, inter vias vilissimas poterit numerari. Quantum ad venationem testamentorum, et legatorum, (quemadmodum Tacitus Senecam insimulat: "Testamenta et orbos tanquam indagine capi;") adhuc pejor est hæc res: quanto cum hominibus conditionis humilioris, rem habemus, quam in servitio.

Fidem illis nimiam ne adhibeas, qui præ se ferunt contemptum divitiarum: etenim opes despiciunt, qui desperant; neque invenies usquam tenaciores, ubi incipient ditescere. Ne sis in minutis tenax; divitiæ alas habent, et aliquando ex sese avolant, aliquando emittendæ sunt, ut ampliores congregent. Opes suas moribundi relinquunt, aut usui publico; aut liberis, cognatis, et amicis; in utroque genere, legationes paulo moderatiores melius cedunt. Divitiæ magnæ hæredi relictæ, aves rapaces undique ad eas convolare invitant; nisi hæres fuerit ætate et

judicio confirmatior. Similiter fundationes gloriosæ et splendidæ, in usus publicos, sunt instar sacrificiorum sine sale; et nihil aliud quam, dealbata eleemosynarum sepulchra; quæ ab intus cito corrumpentur et putrefient. Itaque dona tua, magnitudine ne metiaris, sed commoditate; et ad debitam mensuram redigas: neque opera charitatis in mortem usque differas: etenim, si quis recte rem æstimet, qui id facit, ex alieno potius donat, quam e proprio.

XXXV. DE AMBITIONE.

Ambitio choleram refert: quod genus humoris, activos, vehementes, alacres, et promptos reddit; nisi obstructionem patiatur. Quod si obstructione concludatur, adeo ut libere permeare non possit, fit adusta, et inde maligna et venenosa: similiter ambitiosi, si in ambitu et petitione sua, repulsas non patiantur, sed semper sint in progressu, polypragmones potius sunt quam periculosi: sin in cupiditatibus frænentur, et subinde frustrentur, malevolentiam et invidiam in corde fovent; et iniquo prorsus oculo, tum res, tum homines intuentur; ac tum demum in sinu lætantur cum res male cedant: qui quidem animi affectus, cum servis regum, aut rerumpublicarum pessime congruit. Bonum itaque principibus fuerit, (si ambitiosis utantur,) ita rem disponere, ut perpetuo directi, nunquam retrogradi sint. Quod quia sine præjudicio fieri non potest, melius esset, ab hujusmodi ingenii hominibus omnino abstinere. Etenim, si ipsi cum servitio suo non assurgant, operam dabunt ut servitium suum cum ipsis corruat. Verum, quia modo diximus ambitiosos non adhibendos, nisi urgente necessitate, operæ pretium fuerit jam dicere, quibus in casibus, necessarius sit eorum usus.

Imperatores et duces in bello boni, utcunque ambitiosi sint, omnino recipiendi: etenim utilitas ipsorum, ut præficiantur, cætera compensat: militem autem deligere, qui ambitione vacet, perinde est, ac si calcaribus eum spolies. Quin et alter usus ambitiosorum est, ut umbellæ loco principibus sint, contra invidiam et periculum: nemo enim eas partes subibit, nisi sit instar columbæ occæcatæ, quæ ideo in sursum volat, quia circumspicere non potest. Est etiam alius usus ambitiosorum non parvus, ut prægrandibus alas amputent, et eorum potentiam labefactent; quemadmodum Macronem Tiberius adhibuit, ad dejiciendum Sejanum.

Quandoquidem igitur, in casibus memoratis, necessarii

sint, superest ut ostendamus, qua ratione sint frœnandi et coercendi, ut minus ab illis impendeat periculi. Perniciosi minus sunt, si natalibus ignobiles, quam si nobiles: si ingenio paulo truciores et asperiores, quam si gratiosi et populares: denique si nuper honoribus admoti, quam si veteratores facti sint, et in honoribus suis muniti. Signum infirmi animi in principibus, a plerisque ducitur, si gratiosos et intimos sibi adjungant: attamen, si verum dicendum est, non aliud reperitur remedium præstantius, contra potentiam nimiam procerum, aut magistratuum. Siquidem, quando juvandi et nocendi potestas, penes gratiosum residet, vix fiet, ut alius aliquis ex proceribus, magnopere potentia turgeat. Alia ratio ambitiosos coercendi non mala est, si per alios æque ambitiosos, et protervos, librentur: sed tum opus est consiliariis aliquibus moderatioribus, qui partes medias teneant, ne factiones omnia pessundent: etenim absque illa saburra navis vacillabit nimis. Saltem allicere poterint principes, et animare aliquos humilioris conditionis, qui ambitiosorum veluti flagella sint. Quantum ad ingenerandam illam in ambitiosis opinionem, ut se ruinæ proximos putent, atque eo modo contineantur; si meticulosi fuerint, bene forsitan cedet; sin animosi et audaces, præcipitabit conatus et machinationes eorum; neque est sine periculo. Quod si necessitas flagitet, ut revera rejiciantur, neque id simul, et subito, facere, tutum foret; optimum erit, favoribus et repulsis, eos, alternis, excipere; unde attoniti et confusi hæreant, nescientes quid expectent, et veluti intra sylvam ambulent.

Ex ambitionibus, minus est nociva, cupiditas prævalendi in rebus majoribus, quam se immiscendi rebus omnibus: istud enim confusionem consiliorum parit, et negotia destruit. Etiam minus periculi incumbit, ab ambitioso in negotiis acri, quam ab eo qui gratia et clientelis pollet. Qui inter strenuos, et negotiis pares, eminere studet, magnam profecto suscipit provinciam; verum hoc publico utile est: qui vero illud machinatur, ut viros cordatos deprimat, et ipse solus inter ciphras numerus sit, seculi alicujus lues est et calamitas. Honor tribus insignitur commodis; potestate bene-merendi; aditu facili ad viros principes; et fortunarum proprarium in melius evectione: qui optimam, ex his tribus, fovet intentionem, cum aspirat, vir probus est: princeps quoque, qui hujusmodi in servis suis intentiones, dignoscere valeat et distinguere, princeps est prudens. Verum in genere, præoptandi sunt princi-

pibus hujusmodi servi, qui officio magis ducantur, quam ambitione: quique negotia amplectantur et ament, potius ex conscientia bona, quam ex ostentatione: denique distinguant principes cum judicio, inter ingenia, quæ sese omnibus negotiis ingerunt, et animum promptum seu alacrem.

XXXVI. DE NATURA, ET INDOLE NATURALI IN HOMINIBUS.

NATURA occultatur sæpenumero, interdum vincitur, raro extinguitur. Vis naturam efficit magis impetuosam cum recurrit; doctrina et præcepta affectus naturales reddunt minus quidem importunos, sed non tollunt; verum consuetudo sola ea est, quæ naturam plane immutat et subigit. Qui victoriam de natura sua reportare cupit, sibi nec nimis magna, nec parva nimis pensa, constituat: priora enim animum dejicient, propter frustrationes crebras; posteriora non multum attollent, etiamsi sæpius prævaleat. Atque sub initiis exerceat se adminiculis quibusdam; ut natatores recentes, vescicis aut juncis; deinde cum impedimentis, ut saltatores solent, calceis gravioribus. Etenim, perfectionem in re qualibet inducit, si exercitatio difficilior sit, quam usus. Ubi natura admodum potens est, et proinde victoria difficilis, opus erit per gradus quosdam procedere, qui tales sint; primo, naturam sistere ad tempus aliquod; more illius, qui cum irasceretur, literas alphabeti, priusquam quicquam faceret, recitare solebat: secundo, naturam moderari, et ad minores portiones deducere; ut si quis, abstinentiam a vino exercens, a majoribus haustibus ad minores deveniat: postremo autem, naturam penitus sub jugum mittere et domare. Verum si quis eo animi robore et constantia polleat, ut se subito eximere et vindicare poterit, hoc optimum fuerit:

> Optimus ille animi vindex, lædentia pectus
> Vincula qui rupit, dedoluitque semel.

Neque antiqua regula rejicienda; ut naturam, adinstar bacilli, in contrariam partem flectas; quo recta tandem deveniat. Verum intellige hoc, ubi extremum illud alterum, in vitium non ducat. Insuper et hoc advertas, ne habitum superinducere contendas, nixu continuo, sed intermisso; nam intermissio impetum redintegrat, et adauget; et si

quis, dum tyronem agit, perpetuo se exerceat, eveniet, ut errores, non minus quam facultatem imbibat. Neque huic malo succurritur, nisi per tempestivas intermissiones. Præterea, victoriæ in naturam, non nimium cito, triumphum accinas; natura enim, ad longum tempus, sepulta jacebit, et tamen occasione data reviviscet: id quod contigit puellæ apud Æsopum, ex fele in mulierem conversæ; quæ civiliter admodum in mensa sedebat, donec mus in conspectu ejus forte curreret. Itaque occasiones tales, aut omnino evites, aut iisdem frequentius insuescas, quo minus moveant. Indoles cujusque naturalis optime deprehenditur, in consuetudine familiari; in hac enim nulla intervenit affectatio: in perturbationibus; siquidem illæ præcepta et regulas penitus excutiunt: denique, in casu aliquo novo et insolito; quia tum a consuetudine deseritur. Felices dixerim, quorum indoles naturalis, cum vitæ suæ genere congruit: alias vere dicere possint; "Multum incola fuit anima mea." In studiis, quicquid a natura tua alienum repereris, stata tempora tibi præfigos ad ejusdem exercitationes et meditationes; sin autem cum genio tuo convenerit, de statis horis ne sis solicitus; cogitationes enim tuæ sponte illuc convolabunt, prout negotia et studia cætera permittent. Natura cujusque, ex vi innata, aut bonas, aut malas herbas, producit: itaque sedulo et tempestive illas irriget, has evellat.

XXXVII. DE CONSUETUDINE ET EDUCATIONE.

Cogitationes hominum sequuntur plerunque inclinationes suas; sermones autem, doctrinas, et opiniones quas imbiberunt; at facta eorum ferme antiquum obtinent. Itaque, ut bene notat Macciavellus, (licet in exemplo scelerato,) minime fidendum est, aut naturæ violentiæ, aut verborum grandiloquentiæ, nisi corroborentur consuetudine. Instantia ejus hæc est: in facinore aliquo audaci et crudeli patrando, non acquiescendum esse, aut in naturæ alicujus ferocia, aut in promissis constantibus, nedum juramentis; sed committendum scelus esse viris sanguinolentis, et jamdudum cædibus assuetis. Sed Macciavello, de fratre quopiam Clemente, aut Ravillaco, aut Jauregua, aut Baltazare Gerardo, aut Guidone Faulxio, nihil innotuit. Verum tenet regula ejus; naturam, aut promissorum fidem et ferociam, viribus consuetudinis haud æquipollere. Solummodo, superstitio; nostris temporibus, eo provecta est; ut primæ classis sicarii, laniis obfirmatis minime cedant;

atque decreta votiva, etiam in re sanguinaria, consuetudinis vires exæquent. In aliis quibuscunque, consuetudinis potentia clare elucescit: adeo ut miraculi instar sit, audire, quot professiones, protestationes, promissa, verba grandia, jactitent plurimi; et tamen, istis omnibus posthabitis, pro more consueto agere: acsi imagines essent, et machinæ plane inanimes, solis consuetudinis rotis impulsæ et actæ. Videre etiam licet consuetudinis tyrannidem, in aliis multis. Indi, (loquor de gymnosophistis, et veteribus, et modernis,) se leniter super pyram componunt, atque hoc modo seipsos igne sacrificant. Quin et fœminæ cum maritis in rogum immitti properant. Pueri Spartani, antiquis temporibus, flagris cædi sustinebant, super aram Dianæ, vix ejulatu, aut gemitu ullo emisso. Memini sub initiis reginæ Elizabethæ, rebellem quendam Hibernum, supplicationem deputato obtulisse, ut torque lignea, non fune, suspenderetur; quia illud magis in more rebellibus erat. Inveniuntur monachi in Russia, qui ad pœnitentiam complendam, tota nocte hyemali, in vase aqua repleto, non recusabunt sedere, donec glacie constringantur. Plurima denique exempla adduci poterint, plane stupendas consuetudinis vires, tam super animum, quam super corpus, prodentia. Quandoquidem igitur mos, veluti summus sit humanæ vitæ moderator et magistratus, curæ sit imprimis, ut mores bonos asciscamus. Certe consuetudo validissima, cum a pueritia incipit: hanc educationem appellamus; quæ nihil aliud est, quam a teneris annis imbibita consuetudo. Ita videre est, in linguis ediscendis, linguam ipsam magis commode se applicare omnibus expressionibus et sonis; artus quoque magis agiles et flexiles, ad omnes posituras et motus esse; in pueritia, aut adolescentia, quam postea. Verissimum enim est, opsimathes istos novam plicam non bene admittere: nisi fuerit in nonnullis hominibus, quibus animi nondum fixi, sed eosdem apertos ad omnia præcepta conservarunt, quo continuo emendationem reciperent; id quod rarissimum est.

Verum si consuetudinis vires, cum simplex solummodo sit, et sejuncta, tantæ sint; multo magis consuetudo copulata, et conjuncta, et in collegium coacta, excellit. Isthic enim exemplum docet, relevat societas, emulatio stimulat, gloria animos extollit: ita ut in hujusmodi locis, vires et influxus consuetudinis tanquam in exaltatione sint. Certe, multiplicatio, et (ut chymicorum vocabulo utar,) projectio, super naturam humanam, consistit in societatibus bene institutis, et disciplina salubri informatis. Etenim respub-

licæ recte administratæ, quin et leges bonæ, alunt virtutem in herba, sed semina ipsius non multum promovent. Verum infelicitatis orbis hoc habet, ut media maximarum virium, applicentur quandoque finibus, minime expetendis.

XXXVIII. DE FORTUNA.

NEGARI non potest, quin accidentia et casus externi, ad hominum fortunas, vel promovendas, vel deprimendas, plurimum possint. Gratia alicujus ex magnitibus, opportunitas, aliorum obitus, occasio virtuti cujusque congrua. Veruntamen, fortunam suam fingere cuique præcipue, in manu propria est. "Faber quisque fortunæ suæ;" inquit comicus. Atque inter externas causas illa frequentissima: Stultitiam unius, alterius fortunam promovere. Nemo enim ita subito evehitur, ac occasione errorum alterius. Ut inquit adagium; "Serpens, nisi serpentem comederit, non fit draco."

Virtutes apertæ et conspicuæ laudes pariunt; at insunt virtutes quædam occultæ et latentes, quæ pariunt fortunam. Nimirum, facultates nonnullæ se expediendi, quæ nomen non habent. Hispanum vocabulum, (desemboltura,) eas quadam ex parte innuit. Scilicet; cum non inveniuntur in natura alicujus obices aut impedimenta: sed rotæ animi ad motum rotarum fortunæ versatiles sunt. Ita enim Livius, (postquam Catonem majorem his verbis descripsisset; "In illo viro, tantum robur corporis et animi fuit, ut quocunque loco natus esset, fortunam sibi facturus videretur,") illud diserte notat, quod ei fuisset ingenium versatile. Quare si quis limis et adductis oculis aspiciat, videbit Fortunam: cæca enim licet sit, haud tamen prorsus invisibilis. Etenim via fortunæ similis est galaxiæ in æthere; quæ concursus est, sive coacervatio complurium stellarum minutarum, seorsim invisibilium, sed conjunctim luminosarum. Eodem modo, complures virtutes sunt exiguæ, et vix in notam incurrentes; sive potius facultates et consuetudines appositæ; quæ fortunatas reddunt. Itali ex ipsis nonnullas notant; quales quis minime putaret. Cum hominem innuunt, cui prosperam fortunam spondent, inter cæteras ejus qualitates adjicient, quod habeat poco di matto. Neque sane inveniuntur aliæ duæ qualitates, magis ad hanc propitiæ; quam si quis habeat modicum ex stulto, et non nimium ex honesto. Itaque, quibus patria, aut principes sui, nimio plus chari extiterunt; iidem nunquam

fortunati fuerunt; neque profecto esse possunt. Quando enim cogitationes suas, extra se ipsum quis collocaverit, viam suam bene inire nequit.

Fortuna præpropera, magna molientes, et nonnihil turbulentos, reddit; at fortuna exercita ea est, quæ efficit prudentes et cordatos. Fortuna proculdubio, saltem propter filias suas, honorem meretur; confidentiam scilicet, et existimationem; etenim has duas parit fortuna prospera; alteram intra nos ipsos; alteram in aliis erga nos; eæque vicissim pariunt animos et auctoritatem. Viri cuncti prudentes, quo invidiam suarum virtutum amoliantur, omnia providentiæ et fortunæ imputare solent: ita enim decentius et liberius, eas sibi assumere possint: quinetiam majestatem homini quandam addit, si videretur Numini curæ esse. Sic Cæsar dum animaret gubernatorem navis in tempestate, dixit; "Cæsarem portas, et fortunam ejus." Sic Sylla nomen Felicis elegit, non Magni. Atque illud observationem non præteriit; eos, qui ex professo, sapientiæ et artibus propriis, nimium tribuerunt, in fine, infortunatos evasisse.

Narratur de Timotheo Atheniensi, postquam in reddendis rationibus præfecturæ suæ, hanc clausulam, ad ravim usque, inseruissit; "Atque in hoc nullæ erant fortunæ partes;" deinceps illi nihil cessisse prospere. Sunt certe, quorum fortuna similis carminibus Homeri, quæ majore cum facilitate fluunt, quam aliorum poëtarum versus: id quod Plutarchus de fortuna Timoleontis, ad fortunas Agesilai, aut Epaminondæ, comparata, prædicat. Hoc vero ut fiat, sine dubio, in nobis ipsis, maxime situm est.

XXXIX. DE USURA SIVE FŒNORE.

Plurimi invectivas quasdam ingeniosas, in fœneratores, commenti sunt. Dicunt; miserum esse, diabolum in Dei partem involasse, decimus scilicet. Fœneratorem maximum esse sabbathi violatorem; aratrum siquidem suum non cessare sabbathis. Fœneratorem fucum esse, de quo Virgilius;

Ignavum fucos pecus a præsepibus arcent.

Fœneratorem, legem primitivam, post lapsum hominis, latam, pessundare; quæ fuit; "In sudore vultus tui comedes panem tuum;" minime vero; in sudore vultus alieni. Fœneratores pileis luteis indui oportere, qui judaizant.

Rem esse contra naturam, ut pecunia generaret pecuniam; et hujusmodi alia. Ego vero hoc dico tantum; "Fœnus esse, inter concessa, propter duritiem cordis. Cum enim necesse sit hominibus, ut pecunias mutuo dent, et accipiant; sintque tam duro corde, ut eas gratis commodare nolint, reliquum est ut permittantur usuræ. Alii nonnulli in medium adduxerunt, callidas quasdam et suspectas propositiones, de argentariis, et excambiis publicis, detectione fortunarum hominum singulorum, et aliis hujusmodi artificiis. Verum pauci de fœnore disseruerunt solide et utiliter. Optimum fuerit proponere nobis ante oculos, fœnoris commoda, et incommoda; ut bonum vel ponderetur, vel separetur; quinetiam cavere imprimis, ne dum fœnore feramur in melius, intercipiamur et incidamus in pejus.

Incommoda fœnoris hæc sunt. Primum, quod mercatorum numerum minuit. Nam si ignava hæc, pecuniæ in fœnus erogatio, e medio tolleretur, nummi non delitescerent præ socordia, sed, magna ex parte, in mercaturam impenderentur; quæ instar venæ portæ, cuivis regno est, ad opes introducendas. Secundum, quod mercatores inopes reddit: sicut enim colonus, terram colere ita fructuose nequit, si reditum solvat nimis gravem; ita mercator, tam commode et lucrose, mercaturam suam exercere vix potest, si pecuniis fœnore sumptis, negotietur. Tertium incommodum duorum priorum appendix quædam est, portoriorum et vectigalium publicorum imminutio, quæ fluunt et refluunt, pro modo commercii. Quartum, quod thesaurum, et pecunias regni; sive reipublicæ in paucorum manus reducit: cum enim fœneratoris lucrum certum sit, cæterorum incertum, eveniet in fine ludi, prout fit sæpe in alea, ut maxima pars pecuniæ promo cedat. Illud autem pro inconcusso tenendum, florere rempublicam imprimis, cum pecuniæ dispergantur, non coacerventur. Quintum, quod terræ et prædiorum pretium deprimit: etenim pecuniæ insumuntur, vel in mercaturam, vel in prædiorum coëmptiones; fœnus autem utrique obviare videtur. Sextum, quod omnes labores, molimina, et inventa nova quæcunque, enervat et hebetat; in quibus pecunia minime sibi deesset, nisi a torpedine ista impediretur. Postremum, quod tinea est et teredo facultatum quam plurimorum hominum; id quod, tractu temporis, egestatem publicam parit.

E contrario, commoda fœnoris hæc sunt. Primo, quod utcunque usuræ in aliquibus mercaturæ noceant, in aliis nihilominus prosunt: certissimum enim est, maximam mercaturæ partem, a junioribus mercatoribus exerceri,

fœnore sumptis pecuniis; unde si fœnerator, pecunias suas, vel exigat, vel non emittat, secutura necessario est magna mercaturæ clades. Secundum est, quod nisi prompta hæc a fœneratoribus pecuniarum mutuatio, hominum necessitatibus subveniret, in extremas angustias cito redigerentur; quandoquidem cogerentur res suas, (sive bona mobilia fuerint, sive prædia,) nimis vili pretio vendere: itaque, ubi fœnus rodit tantum, distractiones præproperæ penitus absorberent. Nam quantum ad oppignerationes, aut ea quæ a jureconsultis appellantur mortua vadia, huic certe malo remedium vix exhibebunt: siquidem aut ea prorsus non accipient homines sine fœnore; aut si accipiant, solutione ad diem minime præstita, summo jure agent. Memini pecuniosum quendam, virum durum, rure agentem, qui solebat dicere: "In malam crucem abeat ista fœneratio; impedimento est, quo minus pignorum et obligationum pœnas exigere possimus." Tertium et ultimum hoc est: nugas meras dico, si quis existimet, mutuationem pecuniarum facilem, non admisso fœnore, fieri posse: neque rursus quis animo comprehenderit, innumera quæ sequentur mala, si contractus illi, mutui dati et accepti, convellantur. Itaque de abolendis prorsus usuris sermones facere ineptum foret. Respublicæ omnes, pro diversa tamen ad sortem ratione, eas tolerarunt; adeo ut opinio illa in Utopiam protinus releganda.

Dicamus jam de reformatione et norma usurarum, quibus nimirum modis, incommoda earum optime evitentur, commoda retineantur. Patet jam, conferendo inter se commoda et incommoda usurarum, (quod modo fecimus,) duo esse, quæ reconciliare oportet. Prius, ut retundantur dentes fœnoris, ne nimium mordeat: secundum, ut viris pecuniosis aperiatur via, qua ad pecunias mercatoribus præstandum invitentur, ne commercium intercidat aut languescat. Hoc autem fieri non potest, nisi in fœnore, duas proportiones introducas; minorem, et majorem. Si enim fœnus, ad unicam tantum proportionem, eamque minorem redigas, mutuo accipientem aliquantulum levabis, sed mercator pecunias non facile reperiet. Atque insuper notandum est, mercaturam, cum sit omnium maxime lucrosa, fœnus ad proportionem bene magnam ferre posse; alios contractus minime.

Ut his duabus intentionibus satisfiat, hac via insistere licet. Duæ sunto fœnoris proportiones: prior omnibus permittatur; posterior cum licentia, aliquibus tantum hominibus, et in aliquibus reipublicæ locis, ubi mercatura

fervet, concedatur. Primo igitur, (si nos audias) reducatur fœnus ad partem vicesimam sortis pro mutuatione in annum: ea proportio edicto promulgetur, ut libera sit omnibus. Pro ea accipienda, princeps sive respublica, mulctæ omni renunciet. Hoc ab obstructione aliqua generali, aut difficultate majore, mutuationem conservabit. Hoc innumeris mutuatoribus, ruri et alibi degentibus, solamini erit. Hoc magna ex parte prædiorum pretia adaugebit. Quandoquidem annuus valor prædiorum, hic apud nos in Anglia, excedet illam fœnoris, ad hanc proportionem redacti; quantum annuus valor sex librarum, excedit illum quinque tantum. Hoc denique, industrias hominum, ad utilia et lucrosa inventa, acuet et excitabit: eo quod plurimi hujusmodi inventis potius se dedent, quam lucro tam exili, quale diximus, ex usuris, acquiescere; præsertim cum lucro jampridem majori ex iisdem assuevissent. Secundo, certis quibusdam hominibus, commodandi mercatoribus notis, et non aliis quibuscunque hominibus, licentia concedatur: hoc autem fiat, additis cautionibus quæ sequuntur. Sit proportio, (etiam hæc de qua loquimur,) illa paulo remissior, quam antea solvere solebant: hoc pacto, universi, tam mercatores, quam alii, reformatione hac recreabuntur. Princeps autem, sive respublica, exiguam aliquam summam percipiat, pro licentiis singulis; reliquum lucri, fœneratori cedat: si enim lucrum fœneratoris leviter tantum minuatur, eum nullo modo a fœnore exercendo deterrebit: exempli gratia; si quis antea decem, aut novem libras, pro sorte centum librarum, quotannis accipere solebat; is etiam octo potius libris, contentus erit, quam fœneratorem exuet; aut certa cum incertis commutabit. Sint isti, quibus licentia scilicet conceditur, numero minime definiti; sed tamen ad urbes aliquas, et oppida quæ mercatura florent, restringantur: ita enim, prætextu licentiarum, opportunitatem non habebunt, pecunias aliorum pro suis commodandi: nec novem aut octo librarum proportio, licentia munita, generalem illam quinque librarum absorbebit: nemo siquidem, pecunias suas, procul a se mittere, aut in manus ignotas concredere, præoptabit.

XL. DE JUVENTUTE ET SENECTUTE.

JUVENIS annis poterit esse senex horis, si temporis jacturam non fecerit. Sed hoc raro contingit. Generaliter, juventus similis est primis cogitationibus, quæ secundis sapientia cedunt. Etenim inest cogitationibus juventus quædam, non minus quam ætatibus. Attamen inventio juvenum vivacior est quam senum; atque imaginationes in mentes eorum illabuntur melius, et veluti divinius. Ingenia præfervida et quæ cupiditatibus violentis, ac perturbationibus, huc illuc impelluntur, non matura fiunt ad res gerendas, donec meridiem ætatis suæ attigerint: ut videre est in Julio Cæsare, et Septimio Severo. De quorum posteriore dictum est: "Juventutem egit erroribus, imo furoribus, plenam:" qui tamen, in serie imperatorum universa, fuit propemodum celeberrimus. Sed ingenia sedata et composita, etiam in juventute florere possint. Cujus rei exempla cernuntur, in Augusto Cæsare, Cosmo duce Florentiæ, Gastono de Fois, et aliis nonnullis. Ex altera parte, calor et vivacitas, si in senectute inveniantur, temperamentum optimum constituunt ad negotia. Juvenes ad inveniendum magis idonei sunt, quam ad judicandum; et executione potius quam consiliis validi; et ad negotia nova melius adhibentur, quam ad consueta. Etenim, experientia senum, in iis quæ sub experientia eorum cadunt, eos dirigit; sed in rebus novis, eos seducit. Errores juvenum negotia sæpenumero pessundant; verum errores senum non ultra fere procedunt; nisi ut plus fieri potuisset, aut citius. Juvenes, in rebus gerendis et tractandis, majora amplectuntur, quam comprehendere valeant; plura movent, quam componere rursus sciunt; ad fines advolant gradibus et mediis non bene pensitatis; præcepta quædam absurde persequuntur, in quæ casu inciderunt; extrema remedia a principio usque tentant; denique quod errores conduplicat, errores agnoscere, aut revocare, detrectant: similes equis male domitis, quæ nec se sistere, nec vertere, volunt. Senes plus satis objiciunt; in consultationibus nimium morantur; pericula plusquam expedit reformidant; pœnitentia præpropera vacillant; atque negotia raro admodum ad periodum justam deducunt; sat putantes mediocritate quadam successus frui. Bonum certe fuerit, in negotiis, mixturam adhibere, et senum, et juvenum: illud enim in præsens utile erit, ut

virtutes utriusque ætatis, defectus earum corrigent; utile etiam futuro, ut juvenes perdiscant, dum senes moderentur; postremo accidentia externa melius compescit, quia senes auctoritate, juvenes gratia et popularitate, pollent. At in moralibus, juventus fortasse primas tenebit, ut senectus in politicis. Ex Rabbinis quispiam, super textum illum; " (Juvenes vestri videbunt visiones, et senes vestri somniabunt somnia;)" sic infert; quod juvenes, propiore ad se aditu, Deus dignatur, quam senes: quia visio revelatio clarior et manifestior est, quam somnium. Et sane, quanto quis magis, de mundo bibit, tanto plus toxico ejus inficitur: tum senectus, potius in facultatibus intellectus, quam in virtutibus voluntatis et affectuum, proficit. Sunt, qui in juventute admodum præcoces sunt, sed currentibus annis cito marcescunt, et deveniunt evanidi. Tales sunt; primo qui ingenia nacti sunt fragilia, quorum acies facile retunditur: qualis fuit Hermogenes rhetor; cujus libri subtilissimi sunt; verum ipse paulo post stupidus evasit. Secundum genus eorum, quibus naturales quædam facultates insunt, quæ magis juventutem decent, quam senectutem; qualis est oratio fluens, et luxuriosa; quæ in juvene laudatur; in sene non item. Ita Cicero loquitur de Hortensio: " Idem manebat, neque idem decebat." Tertium eorum, qui sub initiis, nimium efferuntur; et magnanimitate præditi sunt, supra quam ætas provectior ferre valeat: qualis fuit Scipio Africanus, de quo Livius ita prædicat; " Ultima primis cedebant."

XLI. DE PULCHRITUDINE.

Virtus, instar gemmæ pretiosæ, optima est, sine ornamentis inserta. Atque profecto eadem præstat, in corpore decoro, licet non delicato; quodque aspectus dignitatem potius præ se ferat, quam pulchritudinem. Neque fere reperies, eximie formosos, virtutibus pollere: ac si natura, in hoc magis incubuisset, ut non turpiter erraret, quam ut aliquid excellens produceret. Itaque conversationibus apti sunt, at excelsos spiritus non gerunt: et urbanitati potius student, quam virtuti. Sed hoc in omnibus non tenet. Siquidem Augustus Cæsar, Titus Vespasianus, Philippus Pulcher rex Gallus, Edovardus Quartus rex Angliæ, Alcibiades Atheniensis, Ismael Persa, viri prorsus magni fuerunt, et nihilominus perpulchri.

In pulchritudine præfertur venustas colori; et decorus

ac gratiosus oris et corporis motus, ipsi venustati. Ea præcipua pulchritudinis portio quam pictura repræsentare non potest; imo nec effigies ipsa viva, primo aspectu. Non reperitur pulchritudo aliqua excellens, cui non insit aliquid minus conforme, in compagine. Haud facile quis dixerit, utrum Apelles, aut Albertus Durerus, nugator major fuerit; quorum alter hominem secundum proportiones geometricas effingere voluit; alter, ex compluribus faciebus, optimas quasque partes desumendo, unam satagebat depingere excellentem. Tales, (credo,) effigies, vix ulli placebunt, præterquam pictori ipsi. Non quin existimem, elegantiorem faciem depingi a pictore posse, quam unquam in vivis fuit; sed hoc ei contingere oportet, ex felicitate quadam, et casu, (veluti musicis sui cantus, non autem ex regulis artis. Videre est facies nonnullas, quarum partes singulæ, examini si subjiciantur, vix unam reperies quam separatim probes; quæ tamen in consortio satis placent. Quod si verum sit, pulchritudinem præcipuam sitam esse, in motu decoro, mirum sane non est, si provectiores ætate, aliquando videantur junioribus amabiliores: secundum illud Euripidis; "Pulchrorum autumnus pulcher:" etenim fieri non potest, ut juvenis per omnia decus tueatur, nisi forte juventutem ipsam, ad supplementum decoris assumas. Pulchritudo est instar fructus horarii, qui facile corrumpitur; nec diu durat: atque sæpe juventutem inducit dissolutam, senectutem autem sero pœnitentem: attamen si bene collocetur, virtutes splendere facit, vitia erubescere.

XLII. DE DEFORMITATE.

Deformes naturam fere ulciscuntur: sicut enim natura minus illis propitia fuit, ita et illi naturæ vicissim adversi; cum sint plerique ipsorum, (ut loquitur Scriptura,) "sine affectione naturali." Est proculdubio consensus, inter animam et corpus; atque natura, ubi peccat in uno, periclitatur in altero. Sed quia in fabrica animæ conceditur homini electio, in fabrica corporis imponitur necessitas; astra inclinationis naturalis, obscurantur nonnunquam, a sole virtutis et disciplinæ. Consentaneum itaque fuerit, de deformitate dicere, non ut signo, quod quandoque fallit; sed ut causa, quæ per-raro effectu destituitur. Quicunque in persona sua, aliquid habet, quod contemptum inducit, perpetuum habet in se stimulum, quo a contemptu se vin-

dicet: itaque deformes semper audacissimi; in principio, veluti in defensione sua, utpote qui contemptui exponuntur; sed processu temporis, ex habitu acquisito. Iterum deformitas industiam acuit; ejus generis industriam, ut aliorum defectus et infirmitates sedulo rimentur; unde habeant quod rependant. Præterea, in potentioribus, suspiciones et zelotypiam, versus eos, extinguit; veluti homines quos tuto despicere liceat: competitores autem et æmulos consopit; utpote nihil suspicantes, de promotione eorum ad honores, donec ipsos in possessione honorum videant. Adeo ut si rem diligenter introspicias, in magnis ingeniis, deformitas ascensum ad honores patefacit. Reges, antiquis temporibus, (atque hodie etiam in imperiis nonnullis,) eunuchorum fidei magnopere inniti solebant: qui enim erga omnes invidi sunt, uni magis fidi sunt, et obnoxii. Attamen fidem illis adhibebant, potius ut rimatoribus bonis et susurronibus, quam aut magistratibus aut ministris publicis. Similis etiam est ratio deformium. Manet illa regula, quam antea posuimus: deformes, si animosi sint, a derisu et ignominia liberare se gnaviter contendent: quod fieri non potest, nisi aut per virtutem, aut per malitiam. Itaque nil mirum cuiquam videatur, si quandoque in viros egregios evadant; qualis fuit Agesilaus, Zangerus Solymanni filius, Æsopus, Gasca Peruviæ præfectus; Quin et Socrates illis annumerari possit; cum aliis.

XLIII. DE ÆDIFICIIS.

Ædes extruuntur, ut in iis habitemus, non ut eas spectemus: pulchritudini igitur præponatur usus, nisi forte utrunque obtineri possit. Relinquamus fabricas ædium speciosas, quæ admirationem incutiunt, palatiis poetarum incantatis; qui eas extruunt sumptu parvo. Qui domum elegantem ædificat, sed in situ malo, carceri seipsum mandat. Situm autem malum intelligo, non tantum ubi aer insalubris, sed etiam ubi aer inæqualis est: quales sunt ædes, quæ extruuntur quidem, in colliculo paululum elevato; sed cincto undique, more theatri, collibus altioribus; ubi ardor solis constringitur, venti autem, veluti in canalibus, variis æstibus reciprocantur: adeo ut in hujusmodi situ, subito sentias, diversitatem non minorem, caloris et frigoris, quam si in locis diversis habitares. Neque malum situm facit aeris solummodo conditio prava; verum etiam viarum et adituum incommoditas; fora rerum venalium

indiga; et (si Momum consulas) vicini mali. De compluribus aliis non loquor; qualia sunt, aquarum absentia; sylvarum defectus, quæ et focum, et umbram, præbeant; sterilitas soli, aut quod ex variis glebarum generibus minime commistum sit; prospectus coarctatus; defectus terræ planæ et æquabilis; locorum defectus in propinquo, qui venationibus, aucupiis, cursibus equorum, idonei sint; mare nimis in vicino, aut nimis in remoto; commoditas nulla fluviorum navigabilium, aut etiam incommoditas ipsorum ob inundationes; situs remotior ab urbibus magnis, quod negotiis obest, aut etiam propinquior, quod victui necessaria absorbet, et omnia cara reddit; locus ubi quis latifundia ampla possideat, aut acquirere possit, et locus contra ubi pennas extendere nequeat: quæ singula minime eo animo enumeramus, acsi domus aliqua his incommodis omnibus vacare possit, verum ut tot ex illis evitemus, quot evitari concedatur; atque rursus, si quis domos plures ædificet, ita rem disponat, ut quæ in una desint commoditates, adsint in altera. Responsum Luculli Pompeio, bellulum erat: qui, cum in palatio Luculli, immensas et luminosas porticus et cameras conspexisset, sic infit: "Optime proculdubio hîc habitatur æstate, sed quomodo hyemem toleras?" Cui Lucullus: "Quid, numnam me putas, avium prudentiam non assequi; quarum nonnullæ, hyeme ingruente, sedes mutant?"

Transeundum jam a situ domus, ad domum ipsam. Imitabimur Ciceronem; qui libros conscripsit "De Oratore," et librum unicum qui inscribitur "Orator:" quorum priores præcepta artis tradunt, posterior perfectionem. Describemus igitur palatium regium, atque ejusdem modulum quendam conficiemus. Prorsus enim mirabilis res est, tam vastas hodie existere moles in Europa, quales sunt Vaticanum, et Escuriale, et nonnullæ aliæ; in quibus tamen, cameram aliquam vere magnificam, vix reperies.

Primum igitur statuo, palatium perfectum neutiquam esse, nisi duas habeat portiones diversas, portionem convivii, ut loquitur liber Hester; et portionem mansionis sive familiæ: alterum ad pompas, magnificentias, et celebritates; alteram, ad habitationis usum. Intelligo, portiones istas duas, extrui debere, non ut latera domus, sed ut frontis ipsius partes: easque exterius uniformes esse, licet interius longe diversas. Conjungi autem volumus portiones istas, per turrim sublimem et splendidam, in medio frontis. Atque, quoad portionem convivii, unicam tantum illic cameram poni velim; eamque supra gradus,

quinquaginta pedes ad minus altam: et subter eam, cameram item alteram, similis longitudinis et latitudinis; quæ apparatum et instructionem, ad festa, ludos, et ejusmodi magnificentias; actores etiam, dum se ornent et parent, commode recipiat. Alteram portionem, mansionis, scilicet, dividi velim præcipue, in aulam, et sacellum, utramque amplam et pulchram: eas vero per universam portionis longitudinem, extendi nolim; sed relinqui in exitu cœnacula duo; hyemale et æstivale: atque subter hæc omnia, (excepto sacello,) cellas amplas subterraneas, collocari volo; quæ culinis privatis, promptuariis, panariis, et similibus, inserviant. Quantum ad turrim; eam elevari volo, usque ad duo tabulata; utrunque quindecim pedes altum, supra duas alas frontis; coopertam plumbo, æquabili, atque statuis per fulcra laterum, in summitate, decoratam: eandem turrim in cubicula diversa distingui volo. Gradus autem turris apertos esse, et in se revertentes, et per senos subinde divisos; utrinque statuis ligneis, inauratis, vel saltem æneis coloris, cinctos, cum statione spatiosa et lata in vertice. Verum cavendum, ne locus ubi famuli comedant, sit ad imum graduum, vel prope: si enim sit, ciborum nidor ascendet, tanquam in tubo quodam. Et de fronte ædificii hactenus. Tantum intelligo gradus primos ascensus, ad viginti pedes sustolli debere; altitudinem scilicet tabulati inferioris.

Ultra frontem ædificii, aream spatiosam designo, cujus latera tria sint ipsa ædium fronte haud paulum humiliora; atque in quatuor angulis ejusdem areæ, turres extruantur, altitudinem laterum prædictorum nonnihil superantes, ad gradus, quibus in superiora ascendatur, capiendos: quæ turres, non recipiantur in planum ædificii; sed extra promineant. Area autem integra lapidibus latis quadrangulis minime substernatur; nam hujusmodi pavimenta calorem molestum æstate, et similiter frigus asperum hyeme, immittunt; sed habeat ambulacra, ex ejusmodi lapidibus, per latera tantum ædificii; et formam crucis, ex iisdem, in medio; cum quadris interpositis, quæ gramine vestiantur, detonso quidem, sed non nimis prope terram. Latus universum areæ, ex parte convivii, occupent spatiosæ et speciosæ porticus. In quibus singulis porticibus, sint in laquearibus, tres aut quinque sphæræ concavæ, (cupolas vocant,) pulchræ, in longitudine positæ; ad æqualem distantiam: sint quoque fenestræ, ex vitro colorato, ubi pingantur columnæ, imagines omnigenæ, flores, et similia. At latus ex parte familiæ, simul cum latere tertio e regione

frontis, complectatur cameras præsentiales, et alias usus ac decoris ordinarii; atque rursus cubicula: sintque etiam tria ista, latera ita extructa, ut exhibeant ædificium duplex; non translucida, sed ex altera tantum parte fenestrata; ut tam matutinis, quam vespertinis temporibus, præsto sint cameræ, in quas sol non intret. Ac commodentur etiam eo modo, ut habeantur ibi cubicula et cameræ tam æstivales ad refrigerium, quam hyemales ad frigus arcendum. Invenies non raro ædes pulchras, sed tamen ita vitro et fenestris repletas, ut vix locum suppeditent, ubi te recipias aut ad solem, aut ad frigus, evitandum. Quantum ad fenestras prominentes sive arcuatas, eas probo tanquam res commodas, (urbibus sane fenestræ ad planum ædificii, et minime protuberantes, magis conveniunt, propter uniformitatem structuræ plateas versus;) sunt enim receptus colloquiis opportuni: atque insuper, tam ventum, quam solem, summovent; quod enim alias, per totam fere cameram, pertransisset, vix ultra fenestram penetrabit. Raræ tamen sint hujusmodi fenestræ arcuatæ, non ultra quatuor; duæ scilicet, ex utroque latere areæ.

Ultra hanc, quam diximus, aream, sit alia interior, paris, et amplitudinis, et altitudinis; horto per exterius circumcincta; interius autem, ambulacris pulchris, arcuatis, usque ad primum tabulatum, circundata. Pars autem exterior solarii inferioris versus hortum, quatenus ad duo latera, convertatur in specum sive cavernam, (grottam moderni vocant,) ad umbram et æstivationem; apertam, aut fenestratam, tantum ex parte horti: sit autem caverna illa solo æqua, non omnino depressa; et eleganti pavimento strata, ad terræ vapores excludendos. Erigatur autem in medio istius areæ fons splendidus; aut opus aliquod ex statuis magnificum; pavimentum autem simile sit areæ illi antedictæ. Hujus areæ ædificia, ex utroque latere, destinentur cameris, et conclavibus, secretioribus: latus autem transversum, porticibus etiam secretioribus. Curandum vero, ut aliquæ, tam ex cameris et conclavibus, quam ex porticibus, designentur ad usum infirmorum; si forte princeps, aut quivis e grandioribus, ægrotaverit. Habeant autem portiones singulæ ægris destinatæ, (ut moderni loquuntur,) ante-cameram, cameram ad cubile, et recameram. Hæc autem, quæ diximus, supra secundum solarium collocentur. At latus transversum solarii inferioris, versus hortum convertatur in porticum, speciosam, patentem, et columnis fultam. Rursus, supra solarium tertium, ex omnibus tribus lateribus, statuantur porticus elegantes,

columnares, et apertæ, ad prospectum et refrigerium horti excipiendum. Verum ad angulos duos lateris transversi, in solario secundo, accommodentur et ornentur, duo splendida et delicata conclavia, (cabinettos moderni vocant;) pavimento nitente, aulæis sumptuosis instructa, vitro crystallino fenestrata, cum cupola elegante in medio. Sint autem conclavia illa, rebus curiosis omnigenis, et spectatu dignis, referata. In supremis quoque porticibus, (si fieri posset,) optarem collocari, juxta parietes, in locis diversis, fonticulos quosdam aquam emittentes; qui per secretos tubos iterum transeant. Interior autem pars, in solario superiore, versus aream, formetur in porticus et ambulacra, bene munita et obducta, ad usum convalescentium. Atque hactenus de modulo palatii ipsius: nam de balneis, et piscinis, non loquor. Superest tamen, ut antequam ad frontem ædium pervenias, collocentur areæ tres; area viridis, gramine vestita, cum pariete in circuitu, et juxta parietem arboribus, ordine positis, sata area altera, ejusdem amplitudinis, sed in pariete cujus, sint turriculæ extructæ, aut simile quid ejusmodi elegantiæ: area item tertia, quæ cum fronte ipsa ædium, quadrangulum constituat; quam ædificio certe aliquo circundatam nolo; neque rursus nudis parietibus cinctam; sed ambulacris supra columnas, non arcus, erectis; in summitate vero plumbo, vel lapide quadrato, coopertis, et ad latera elegantibus statuis parvis, ænei coloris, munitis clausam. Quatenus vero ad ædificia omnia, quæ usibus familiaribus inserviunt, summoveantur illa, ad aliquam distantiam, a palatio ipso; ita tamen, ut interponantur porticus humiliores, et obtectæ; intra quas ad palatium transire possis.

XLIV. DE HORTIS.

Deus ipse primus plantavit hortum. Atque revera, inter solatia humana, illud horti est purissimum. Etenim spiritus hominum maxime reficit et oblectat; quo sine, ædificia et palatia, manus tantum sunt opera, nec sapiunt naturam. Quinetiam notabis, secula cum proficiunt in cultura et magnificentia, citius pervenire ad ædificiorum pulchritudinem, quam ad hortorum elegantiam et amænitatem: quasi elegantia illa hortorum esset res perfectior.

Statuo in hortis regalibus, assignari oportere hortos, pro singulis anni mensibus: in quibus, separatim, plantæ, quæ illo mense florent et vigent, producantur. Pro Decembri,

Januario, et fine Novembris, eligendæ sunt plantæ, quæ per totam hiemem virescunt; Quales sunt, aquifolia; hedera; laurus; juniperus; cupressus; taxus; buxus; pinus; abies: rosmarinus; lavendula; pervinea, flore albo, purpureo, et cæruleo, chamedris; irides quoad folia; arantia, limones, et myrtus, si calidariis conserventur; et amaracus juxta parietem et versus solem satus. Sequuntur pro fine Januarii, et Februario; arbustum chamæleæ germanicæ sive mezereonis, quæ eo tempore floret; crocus vernus, flore luteo, et glauco; primulæ veris; anemones; tulipa præcox: hyacinthus orientalis; chamairis; fritellaria. Pro Martio; omne genus violarum, præcipue purpureæ simplici flore, quæ sunt præcocissimæ; pseudo-narcissus luteus; bellis; amygdalus, quæ tunc floret; malus persica, et cornus, quæ etiam tunc florent; rubus odoratus. Pro Aprili; viola flore albo multiplice; parietaria lutea: leucoium; herba paralysis; irides, et lilia omnigena; flores roris marini; tulipa; pæonia, flore multiplice; narcissus verus; periclemenum sabaudicum; cerasus, et pyrus, et prunus diversi generis in flore; acanthus, quæ tum folia emittit; arbor lelac. Pro Maio, et Junio; cama-cariophyllus omnium generum, præcipue virgineus; omne genus rosarum, moschata sola excepta, quæ serius floret; periclemenum commune; fraga; buglossum; columbina; flos africanus, simplex, et multiplex; cerasus, quæ tum fructum profert; ribes; ficus in fructu; baccæ rubi idæi, vitis flores; lavendula florens; satyrium hortense flore albo; herba muscaria; lilium convallium; malus florens; flos cyaneus. Pro Julio; cariophyllata omnium generum; rosa moschata; tilia florens; pyra, et poma, et pruna præcocia. Pro Augusto; pruna omnium generum; pyra; mala armeniaca; baccæ oxycœcanthæ; nuces avellanæ; melones moschatelline; et omnigeni coloris delphinum, sive consolida regalis. Pro Septembri; uvæ; poma; papaver variorum colorum; mala persica; melo-cotonea; nectarinæ; corna; pyra hyemalia; cydonea. Pro Octobri, et principio Novembris; sorba; mespila; pruna sylvestria; rosæ seræ; malvæ arborescentes flore roseo; et similia. Hæ vero, quas enumeravimus, plantæ, climati Londinensi conveniunt. Sed hoc volo, ut sit alicubi, quasi ver perpetuum, prout fert loci conditio.

Quoniam autem odor florum, spirans in aëre, (ubi undulat more modulationis musicæ,) gratior multo est, quam si eos decerpas manu, ideo nihil magis confert, ad delectationem illam, quæ ex odore florum percipitur, quam nosse

eos flores, et plantas, quæ adhuc crescentes, nec avulsæ, maxime emittunt auras suaves, et aërem odore perfundunt. Rosæ tam pallidæ, quam rubæ, dum crescunt, odoris sui sunt tenaces, nec aërem tingunt; adeo ut juxta sepem earum ambulans, nihil odoris percipies, etiamsi hoc experiaris tempore roris matutini. Laurus itidem, dum crescit, odoris parum emittit: neque etiam ros-marinus, aut amaracus. Id, quod ante omnia, suavissimo odore aërum (crescens) imbuit, est viola; præcipuæ alba, flore multiplici; quæ bis quotannis floret; medio Aprilis, et sub finem Augusti. Ei proxime accedit rosa moschata: tum folia fragariæ marcescentis, quæ halitum emittunt plane cardiacum. Tum flores vitis, qui apparent in racemis noviter protrusis, ad instar pulveris, qualis est in caule plantaginis. Tum rubus odoratus. Tum parietaria lutea, quæ gratissimum edit odorem, sata juxta fenestras conclavis, aut cubiculi in imo solario siti: tum cariophyllatæ, tam minores, quam majores; tum flores tiliæ: tum perielymeni flores, eminus locati: tum flores lavendulæ. De floribus fabæ non loquor, quoniam campestres sunt. At ea, quæ aërem, jucundissimo odore perfundunt, sed non nisi calcata, aut contusa, sunt tria; pimpinella, serpillum, et mentha aquatica. Itaque ambulacra integra his sunt conseranda, ut odorem eorum calcando exprimas.

Horti contentum, (loquor autem de hortis regiis, sicut feci de ædificiis,) haud minus triginta jugerum esse debet: atque illud in tres partes dividi convenit: graminetum in introitu; fruticetum sive eremum in exitu; et hortum præcipuum in medio: præter ambulacra utrinque ad latera. Mihi quidem placet, quatuor jugera gramineto assignari; sex fruticeto; bis quatuor ad ambulacra ad latera; et horto præcipuo duodecim. Oblectamentum ex gramineto duplex est: primum quidem oculis, quibus nihil jucundius est, quam gramen subinde tonsum, et virescens: alterum, quoniam in medio orbita purganda est, qua iri possit versus frontispicium sepis magnificæ, quæ hortum præcipuum includat. At quoniam orbita ista longa erit, neque in magnis ardoribus, anni, aut diei, umbra horti emenda est, ambulatione per graminetum, exposito sole; ideo ambulacra obtecta, duodecim pedes alta, ex opere lignario, utrinque ad latera gramineti extruenda sunt, per quæ hortum introire possis, in umbra continua. Quantum autem ad schemata, et figuras, ex varii coloris terra distinctas, quæ subjaceant fenestris ædificii, nugæ plane sunt. Sæpius videas in placentis talia. Figura quadrata horto optime

convenit; quam undique sepi pulcherrima et arcuata claudi oportet. Arcus extollantur supra columnas, ex opere lignario, pedes decem alti, lati sex: spatia autem inter columnas, ejusdem dimensionis sint cum latitudine arcus. Supra arcus sit sepes continuata, pedes quatuor alta, ex opere itidem lignario; et hanc supra, sit turricula in summitate arcus cujusque extructa, cujus interior capacitas sufficiat avicularum caveæ excipiendæ. Et supra interstitia arcuum collocentur aliæ aliquæ figuræ inauratæ, continentes lamellas vitri collorati, quibus varie ludant radii solares. Hanc autem sepem intelligo, supra aggerem, haud præcipitem quidem, sed mediocriter declivem, sex pedes altum, totum floribus consitum, erigendam esse. Intelligo etiam, ut hæc quadra horti, non totam soli latitudinem occupet, sed satis spatii, variis ambulacris conficiendis, utrinque ad latera relinquat; in quæ, obtecta illa gramineti ambulacra, de quibus diximus, deducant. Verum ad introitum et exitum horti, hujusmodi ambulacra cum sepibus, omnino omittenda sunt: in introitu quidem, ne conspectum amœnæ illius sepis, a gramineto impediat; in exitu autem, ne prospectum fruticeti per arcus intercipiat.

Dispositionem soli, intra claustrum sepis, variandam ad placitum relinquo: hoc interim monens, ut quæcunque ea tandem sit; nimis curiosa et operosa ne sit. Imagines excisas ex junipero, vel alia materia hortensi, non probo: puerilia sunt ista. Humiles sepiculæ rotundæ, instar fimbriarum, cum pyramidibus parvulis, placent. Columnas etiam, et pyramides altas, ex opere lignario, in aliquibus locis sparsas, sepibus vestitas, recipio. Ambulacra ampla et spatiosa esse volo. Ambulacra angustiora et obtectiora ad latera summovenda sunt, neutiquam vero in pomærio horti præcipui collocanda. Consulerem etiam, ut in medio horti sit monticellus pulcher, cum tribus ascensus ordinibus, et tribus ambulacris, ejus latitudinis, ut quatuor una ambulare possint. Et hæc insuper ambulacra perfecte circularia esse suadeo, absque figuris propugnaculorum. Altitudo autem monticelli triginta pedum esto: atque in vertice, domicellus elegans extruatur, cum caminis venuste ordinatis, et absque multo vitro.

Fontes quod attinet, magno sunt illi ornamento, et refrigerio; sed stagna, et piscinæ, exulent: hortum enim insalubrem reddunt, et scatentem muscis, ranis, et similibus. Fontes duorum generum intelligo; unum qui aquam salientem verset, et dispergat, cum crateribus suis; alterum nitidum aquæ puræ receptaculum, quadratum, pedum tri-

ginta vel quadraginta, illime, sine cœno, aut piscibus. Quoad primum, imagines inauratæ, aut marmoreæ, quæ in usu sunt, ornamento esse recte possunt. Sed in eo genere, cardo rei est, ita aquam regere, ut perpetuo fluat; nec consistat, aut in cratere, aut in cisterna; ita ut quiete non sit decolor; versa aut in viridem, aut rubrum, aut hujusmodi; neque muscum colligat, aut putredinem. Etiam, manu purganda est quotidie, ut maneat limpida. Itidem, gradus aliqui ascensus ad fontem, et pavimentum circa eum elegans, decori sunt. Illud alterum fontis genus, quod balneum sive lavacrum dici potest, multum ornatus, et curiositatis, recipere potest, quibus non immoramur. Veluti: ut fundum sit imaginibus decoratum, latera quoque; simul hinc inde vitro variorum colorum, et hujusmodi corporibus politis, et radiantibus, splendens; circundatum etiam clausura humilium statuarum. Sed maximum est illud; cujus, in priore genere fontium, mentionem fecimus; nimirum, ut aqua sit in perpetuo motu; aqua scilicet, quæ balneo superior sit, nutrita; per canales venustos inducta; et rursus, per tubas subter terram æqualis dimensionis, ne aqua diutius consistat, educta. Verum quoad curiosas inventiones; arcuandi aquas sine earum effusione; et eas effingendi in varias formas, (plumarum, poculorum vitreorum, canopæorum, campanarum, et similium;) etiam rupes artificiosas, et hujusmodi, sunt illa quidem spectatu jucunda, sed nihil ad salubritatem, aut suavitatem.

Fruticetum autem, quod tertiam totius horti partem posuimus, velim ut ad similitudinem naturalis deserti prope accedat. Arbores in illo plantari nolo; nisi quod in aliquibus locis, erigi præcipio arborum series, quæ in vertice ambulacra contineant, ramis arborum cooperta, cum fenestris. Subjaceat autem pars soli floribus odoris suavis abunde consita, qui auras in superius exhalent; alias fruticetum apertum esse sine arboribus velim. Dumeta tamen spargi placet, ex rubo odorato, peryclymeno, et vite sylvestri: terram autem ubique consitam volo, violis, fragis præcipue, et primulis veris. Hæ enim plantæ jucundum spirant odorem, et in umbra feliciter crescunt. Dumeta autem, et ambulacra super arbores, spargi volumus ad placitum, non ordine aliquo collocari. Probo etiam cumulos parvos, instar eorum quos talpæ erigunt, (quales in ericetis campestribus esse solent,) alios serpillo, cariophyllatis minoribus alios, alios chamædri quæ florem præbet pulchrum, alios pervinca, alios violis, fragis alios, floribus

paralysis alios, bellidibus alios, alios rosis rubris, alios liliis convallium, alios armeriis rubris, alios helleboro flore purpureo, et floribus similiis, suavibus, et bellis, consitos. Pars etiam cumulorum habeat in vertice frutices; eæ sint, rosa; juniperus; aquifolia; oxyocantha; (sed hæc rarior propter odoris gravitatem dum floret;) ribesium baccis rubris; uva crispa; rosmarinus; laurus; rubus odoratus; et id genus aliæ. Frutices autem ferro resecandæ sunt, ne deformiter excrescant.

Jam solum utrinque ad latera, in ambulacra privata, pro quavis diei parte umbrosa, distribuendum est. Ex iis etiam quædam, a ventis asperioribus ita munienda sunt, ut in iis spatiare possit quis, tanquam in porticu. Quinetiam, ob eandem causam, videlicet ut venti arceantur, ad exitus claudenda sunt. Et hæc clausa ambulacra, præcipue sabulo substernenda sunt, absque gramine, ne in udo ambulatio sit. In plerisque horum ambulacrorum, arbores fructiferæ omnigenæ collocandæ sunt, tam ad parietes exteros, quam in ordinibus interius. Et hoc in genere observari debet, ut terra elevata, in qua arbores fructiferæ plantantur, sit lata, humilis, et molliter ascendens: et floribus suavibus consita, sed raris, ne succo defraudent arbores. Ad exitus soli lateralis utrinque, monticellos fieri probo, ad talem altitudinem parietis exterioris, ut in monticello stanti, in agros pateat prospectus.

Rursus, quoad hortum præcipuum, non negarem, in eo confici debere ambulacra quædam, eaque minime angusta, arboribus fructiferis utrinque consita. Quin et arboreta aliqua, arborum fructiferarum prope consitarum; et umbracula artificiosa et bella cum sedibus ordine elegante locata: verum hæc, nullo modo, nimis confertim; relinquendus est enim hortus præcipuus apertior, et aere perflabilis, et liber. Umbram enim quæras velim, in ambulacris lateralibus, ubi in ardoribus anni, vel diei, ambules. Hortus siquidem præcipuus, comparatus est in temperatiores anni partes, vernas, et autumnales; æstate autem, ad matutina et vespertina tempora, aut etiam ad dies nubilosos.

Aviaria non probo, nisi tantæ sint amplitudinis, ut cespites graminei substerni queant; fruticibus etiam et arbusculis vivis conferantur; ut aves liberius volitent, et se per diversa oblectare, et componere possint; utque nulla in area avearii conspiciatur spurcities.

Quantum vero ad ambulacra in clivis, et variis ascensibus amœnis conficienda, illa naturæ dona sunt, nec

ubique extrui possunt: nos autem ea posuimus, quæ omni loco conveniunt.

Horti itaque regii figuram jam delineavimus, partim præceptis, partim modulo generali, sed minime accurato. Et hac in re sumptibus minime pepercimus. Sed ad principes id nihil est, qui, ut nunc sit, plerunque hortulanos consulunt; atque haud minore sumptu, varia, parum cum judicio, componunt: addentes etiam quandoque statuas, et alia ad magnificentiam, et pompam; sed ad genuinam hortorum voluptatem, et amœnitatem, nihil conducentia.

XLV. DE NEGOTIATIONE.

GENERALITER, melius est, per verba negotiari, quam per literas; et per intercessionem personæ tertiæ, quam per seipsum. Literæ utiles sunt, cum quis, per literas itidem, responsum elicere desiderat; vel ubi sua intersit, exemplaria literarum, quas scripsit, producere, et monstrare: denique, ubi metuere quis merito possit, ne sermo interrumpatur, aut per portiones audiatur. Contra, viva voce tractare præstat, cum facies hominis reverentiam incussura sit; ut fit plerunque in colloquio cum inferiore: aut in rebus, quas extremis tantum digitis tangere convenit; in quibus oculus loquentis, in vultum et gestum alterius intentus, monere possit, quousque procedere liceat; et generaliter, quando libertatem quis sibi retinere cupit, vel dedicendi, vel interpretandi ea quæ dixerit. In tractando per alios, cautius et melius fuerit, eos eligere, qui simplicioris sunt ingenii; quos probabile est, illa, quæ in mandatis habent, executuros; et successum rei fideliter narraturos: quam eos, qui ex aliorum negotiis, aliquid in se honoris aut utilitatis transferre, callidi sunt: atque ea, quæ referent, verbis emollient, ut impense placeant. Tales etiam adhibe, qui negotio, cui præficiuntur, faveant; id enim industriam acuit: atque insuper tales, qui cum re quam tractant congruitatem quandam habent; veluti, audaces ad expostulandum; blandos ad persuadendum; astutos ad observandum et rimandum; protervos, et paulo absurdiores, ad res, quæ aliquid iniqui habent, transigendas. Tales etiam adhibe, qui in negotiis tuis antea tractandis, felices fuerunt, et obtinuerunt; hoc enim confidentiam parit; et omnem lapidem movebunt, quo veluti præscriptionem tueantur. Melius fuerit, hominem cum

quo negotiaris, primo leviter degustare, et quasi ex longinquo, quam ab initio summam rei proponere; nisi forte in animo sit; brevi illum aliqua quæstiuncula, irretire, et opprimere. Præstat cum illis negotiari, qui in ambitu sunt, quam cum illis, qui desideria sua sunt adepti. Si eum alio sub conditione negotieris, prima veluti occupatio, aut possessio votorum, in præcipuis numeranda: id autem cum ratione postulare nequis, nisi aut natura rei talis sit quæ præcedere debeat; aut alteri commode insinuare possis illum opera tua in aliis usurum; aut denique habearis ipse pro homine imprimis integro et verace. Omnis negotiatio eo spectat; aut ut detegat aliquid; aut ut efficiat. Detegunt se homines, vel animum suum communicando; vel cum ira commoti sunt, nec se bene cohibere sciunt; vel cum ex improviso opprimuntur; vel cum necessitate quadam adiguntur, non habentes quod prætexant. Si quem ad nutum fingere cupias, ut inde efficias aliquid; aut inclinationes et mores ejus bene cognoscendi, ut eum manu ducas; aut fines ejus perspiciendi, ut suadeas; aut infirmitates ejus, et ea quibus obnoxius est, exploranda, ut terreas; aut denique amici ejus, qui plurimum apud eum valent, conciliandi, ut eo modo regere possis. In tractando cum callidis et dolosis, verbis eorum minime credendum, nisi fines et intentiones eorum habeas verborum interpretes: quin et optimum fuerit, pauca apud illos loqui, et quæ minime expectant. In rebus quibuscunque difficilioribus, non expectandum, ut quis simul, et serat, et metat; sed præparatione opus est, ut per gradus maturescant.

XLVI. DE CLIENTIBUS, FAMULIS, ET AMICIS.

Clientes sumptuosi minime admittendi; ne dum quis caudæ pennas adauget, alarum pennas præscindat. Eos autem sumptuosos intelligo, non solum qui impensis gravant, sed etiam qui petitionibus molesti et importuni sunt. Clientes communes, conditiones alias, expectare non debent, extra favorem, commendationem si opus sit, et ab injuria protectionem. Clientes autem et amici factiosi, adhuc magis vitandi, qui alicui se applicant, non tam ex amore ipsius cui famulantur; quam ex odio versus alium concepto. Unde sæpenumero sequitur animorum illa abalienatio, quam videre est inter potentiores. Similiter, clientes illi gloriosi, qui in hoc incumbunt, ut loco bucci-

narum sint, ad laudes eorum resonandas, quibus famulantur, haud parum nocent: etenim negotia futilitate sua corrumpunt: tum vero honorem domini sui, (si quis vere rem reputet,) exportant, et mercem invidiæ invehunt. Est et aliud genus clientum prorsus periculosum; qui nil aliud quam speculatores sunt, et secreta familiæ rimantur, ac rursus aliorum auribus insusurrant: attamen hujusmodi homines, apud dominos suos, sæpenumero in summo pretio habentur; siquidem officiosi sunt, et susurros fere commutant. Clientelæ hominum ordinis cujuspiam, si ejusdem cum patrono ordinis sint, (veluti militum versus illum qui præfecturam in bellis gessit, et hujusmodi,) semper pro re decora habitum est, et in bonam partem acceptum, etiam in monarchiis; modo absit pompa nimia, et popularitas. Verum clientela, omnium maxime honorifica, ea est; ut quis patronum se profiteatur, eorum qui virtute et meritis clarent, cujuscunque ordinis sint, vel conditionis. Attamen ubi nulla insignis cernitur in meritis dissimilitudo, præstat mediocribus patrocinari, quam eminentioribus. Atque insuper, si verum omnino dicendum sit, in seculis aliquanto corruptioribus, homines industrii et satagentes, usui magis sunt, quam vera virtute præditi. Certe, in imperando, optimum est, ejusdem gradus subditos, pari comitate tractare: paucos enim immensa gratia prosequi, ipsos magis insolentes, reliquos malevolos efficiet; quandoquidem ordinis paritas æquas gratiæ conditiones, tanquam ex debito, poscit. Verum econtra, in iis, quæ favoris meri sunt, prodest cum delectu afficere; nam eos, qui benignius tractantur, impense gratos reddet, cæteros imprimis officiosos: neque de hoc merito conqueratur quispiam, cum omnia ex gratia, non ex debito prodeant. Recte cavetur, ne sub initiis immoderatius aliquem favore prosequaris; nam quæ tractu temporis sequentur, vix istis initiis respondere possunt. Fingi, (quod aiunt,) et regi, ab amico aliquo, tutum non est: etenim mollitiem quandam animi prodit; tum vero convitiis et scandalo occasionem præbet: plurimi enim, qui nos ipsos immediate non perstrinxissent, amicum illum nostrum contumeliis afficere non verebuntur; atque eo modo honorem nostrum vulnerabunt. Attamen, plurium potestati subjici, et veluti in partes distrahi, adhuc pejus; hoc enim nos reddet, postremæ (ut nunc loquuntur,) editionis, et plenos inconstantiæ. Deliberare cum amicis aliquot paucis, honorabile sane et utile: "Spectatores enim sæpenumero plus vident, quam Lusores:" atque, (ut adagio dicitur,) "Vallis optime collem monstrat." Ami-

citia vera, in orbe, rara admodum; et minime omnium ea quæ inter æquales; quod genus apud veteres celebrari solebat. Si qua est, ea reperietur inter superiorem et inferiorem; fortunæ quorum, altera alteram, comprehendere possint.

XLVII. DE SUPPLICANTIBUS.

Suscipiuntur complura negotia et inventa mala; et petitiones privatæ bonum corrumpunt publicum. Suscipiuntur etiam complura negotia in se bona, sed animo non bono: intelligo, non solum corrupto, sed etiam callido; absque ulla perficiendi negotii intentione. Non desunt, qui petitiones in manus suas recipiunt, et operam avide pollicentur, quibus tamen ut cum effectu procedant, curæ non est: verum si animadvertant, rem aliorum conatu successuram, ipsi quoque gratiam aucupabuntur; aut certe mercedem aliquam secundariam captabunt; aut denique supplicantis spes dum negotium vertitur, in usum proprium convertent. Alii petitiones amplectuntur, eo solum animo, ut negotiis aliorum, quæ simul tractantur, impedimenta injiciant: vel ut aliquid obiter deferant et informent, cujus alias prætextum idoneum parare non potuerint; de petitione ipsa, cum sibi hoc modo consuluerint, nihil solliciti: vel generaliter, ut per aliorum negotia, negotiis suis pontem sternant. Imo et alii tam mala fide agunt, ut petitiones suscipiant consilio deliberato eas destituendi, quo competitori, aut adversario gratificentur.

Certe si quis rem rite perpendat, comitatur omnem petitionem, jus quoddam; vel æquitatis, si sit petitio justitiæ; vel meriti, si sit petitio gratiæ. Si quem moveat inclinatio propria, ut parti iniquiori faveat, in causa judiciali, utatur potius auctoritate sua, ut rem componat, quam ut obtineat. Si quem moveat inclinatio propria, ut favore suo minus merentem impertiat, in causa gratiæ, abstineat saltem ab omni calumnia, et maledicentia, in melius merentem. Petitiones, quas ipse non satis intelligis, amico alicui fido et sagaci demanda; qui referat, an ejusmodi sint, quas salvo honore promovere possis; verum prudenti et anxio judicio amicus ille deligendus; alias quidlibet tibi imponet. Supplicantes, his temporibus, adeo mora, et procrastinationibus, cruciantur, ut veracitas et candor; vel in negotium primitus recusando; vel in successum ejus qualem-qualem animo simplici referendo;

vel in gratiam non ultra quam par est captando; res facta sit, non solum laudabilis, verumetiam gratiosa. In petitionibus gratiæ, prima petitionis oblatio, nullius debet esse momenti; eo usque supplicantis fides, in re illa patefacienda, valere possit, ut si notitia ejus, aliunde quam per eum haberi non potuisset; hoc ei fraudi non sit; sed potius remuneretur. Valorem ejus, quod petitur, ignorare, imperitia quædam est; non secus ac æquitatem ejusdem oscitanter prætervehi, malam arguit conscientiam: Petitiones sedulo occultare, non modicum prodest ad obtinendum; spes enim jactare, competitorum licet alios deterrere possit, alios tamen acuet, et excitabit. Verum temporum opportunitates, ante omnia, in petitionibus valent. Temporum inquam, non tantum respectu eorum in quorum potestate positum est, petitiones vel rejicere, vel concedere; verumetiam respectu eorum, a quibus juste metuendum, ne se illis opponant. In delectu ejus, cui petitionis tuæ curam demandes, respicias magis aptitudinem, quam amplitudinem; atque eum potius adhibe, qui paucioribus negotiis se immiscet, quam qui omnia amplectitur. Denegatæ petitionis iteratio concessioni ipsi quandoque æquipollet; modo quis se, nec animo dejectum, nec male affectum, ostendat; Iniquum petas, ut æquum feras; regula non mala, ubi quis gratia floreat; alias enim, consultius foret, gradibus quibusdam, ad id quod petis, ascendere, et aliquid saltem impetrare: qui enim, in principio, supplicantis erga se studium, amittere non dubitasset; is, in fine, et studium supplicantis, et beneficium prius collatum, simul amittere non sustinebit. Nihil tam leve videtur, quam viros præpotentes, de literis suis interpellare; cum tamen, si literæ illæ, in causis minus honestis, et justis volitent, tantum de existimatione scribentis depereat. Non invenitur in rebuspublicis perniciosius hominum genus, quam generales isti petitionum concinnatores; etenim pestes plane sunt, et lues, negotiorum publicorum.

XLVIII. DE STUDIIS, ET LECTIONE LIBRORUM.

Studia, et lectiones librorum, aut meditationum voluptati, aut orationis ornamento, aut negotiorum subsidio, inserviunt. Usus eorum, quatenus ad voluptatem, in secessu et otio imprimis percipitur: quatenus ad orationis ornamenta, in sermone tam familiari, quam solenni, locum habet; quatenus vero ad negotiorum subsidium, huc

spectat; ut accuratiore judicio, res et suscipiantur et disponantur. Etenim, homines, rerum gerendarum gnari, ad negotia exequenda, idonei fortasse sunt; et in specialibus, judicio non malo utuntur: verum consilia de summis rerum, eorumque inventio et administratio recta, felicius a literatis promanant. Temporis nimium in lectione et studiis terere, speciosa quædam socordia est; iisdem ad ornatum mollius abuti, affectatio mera est, quæ seipsam prodit; de rebus autem, ex regulis artis judicare, scholam omnino sapit, nec bene succedit. Naturam literæ perficiunt, ab experientia autem ipsæ perficiuntur. Dotes enim naturales, instar plantarum sunt, sponte provenientium, quæ culturam et falcem artis desiderant: literæ, e contra, generalia nimis præcipiunt, nisi ab experientia determinentur. Callidi literas contemnunt; simplices admirantur; prudentes, opera earum, quantum par est, utuntur: neque enim literæ verum sui usum satis edocent; sed hæc res, prudentia quædam est, extra eas, et supra eas sita, observatione tantum comparata. Libros non legas animo contradicendi, et disputationum præliis concertandi; neque rursus omnia pro concessis accipiendi, aut in verba auctoris jurandi; neque denique in sermonibus te venditandi; sed ut addiscas, ponderes, et judicio tuo aliquatenus utaris. Sunt libri, quos leviter tantum degustare convenit; sunt quos deglutire, cursimque legere oportet; sunt denique, sed pauci admodum, quos ruminare et digerere par est: hoc est; libri quidam, per partes tantum inspiciendi; alii perlegendi quidem, sed non multum temporis, in iisdem evolvendis, insumendum; alii autem pauci diligenter evolvendi, et adhibita attentione singulari. Invenies etiam libros haud paucos, quos per alios, et vicaria opera, legere sufficiat, eorumque compendia tantum desumere; verum hoc fieri nolim, præterquam in argumentis humilioribus, et auctoribus minoris pretii: alias enim, libi (ut sic dicam) distillati, instar aquarum distillatarum, quas vulgo mercantur, erunt penitus insipidi. Lectio copiosum reddit, et bene instructum; disputationes et colloquia promptum et facilem; scriptio autem, et notarum collectio, perlecta in animo imprimit, et altius figit. Itaque si quis in notando, segnis sit, aut fastidiosus, memoria illi opus est bona; si colloquiis se non exerceat, requiritur ei ingenium promptum; sin in legendo parcus sit, hoc solum relinquitur, ut artificio quopiam utatur, quo videatur ea scire, quæ nescit. Historiarum lectio prudentes efficit; poetarum, ingeniosos; artes mathematicæ subtilitatem

donant; naturalis philosophia judicium profundum parit; moralis gravitatem quandam morum conciliat; dialectica et rhetorica pugnacem reddunt, et ad contentiones alacrem; "Abeunt (ut ait ille,) studia in mores." Quin et vix occurrit, in intellectu, impedimentum aliquod insitum, aut naturale, quod non studio quopiam idoneo, emendari et edolari possit: quemadmodum morbi corporis, exercitiis quibusdam propriis, levari possint. Globulorum lusus calculo et renibus salubris; sagittatio pulmonibus et thoraci; lenis deambulatio ventriculo; equitatio capiti, et similia. Eodem modo, si cui sit ingenium vagum et volucre, mathematicis incumbat; in demonstrationibus enim mathematicis, si mens vel minimum aberret, de novo incipiendum est: si cuipiam ingenium sit minus aptum, ad rerum differentias et distinctiones eruendas, ad scholasticos se conferat: illi enim cymini sectores sunt; si quis ad transcursus ingenii segnis sit, nec alia in aliorum probationem, et illustrationem, accersere, et arripere dextre, noverit, jure-consultorum casus evolvat: adeo ut singuli intellectus morbi, ex literis, medicinas proprias comparare sibi possint.

XLIX. DE FACTIONIBUS.

Plurimi opinionem minime sanam foverunt; hanc nimirum; principi, in status sui administratione, et viro magno, in actionum suarum directione, ad factiones, quæ invaluerunt, præcipue respiciendum; atque hanc principalem prudentiæ partem esse: cum e contra, facultas hæc prudentiæ, quam maxime vigeat, vel in disponendis rebus, quæ ad omnes sine discrimine pertinent, et in quibus homines diversarum factionum coeunt; vel in palpandis, conciliandis, et tractandis singulis. Neque tamen assero, factionum debitam considerationem, esse negligendam. Humilioris fortunæ viri, cum in ambitu sint, alicui parti adhærere debent; verum potentioribus, et jampridem honorem adeptis, consultius est, æquos se præstare, in neutram partem propendendo. Quin, et in ambientibus, ita caute adhærere, ut videatur quis alteri ex partibus addictus, et tamen parti adversæ minime odiosus, viam quandam sternit ad honores, per medium factionum. Factio inferior, et debilior, in conjunctione, plerunque firmior, et constantior: et non raro observari poterit, paucos qui obstinati et pertinaces sint, factionem numerosiorem, sed tamen moderatam, in fine defatigare, et depellere. Factionum altera post-

quam extincta fuerit, illa quæ manet, in factiones novas disrumpitur; veluti, factio Luculli, et optimatum, ad tempus aliquod, se in satis magno vigore, contra factionem Pompeii et Cæsaris, sustinuit; verum postquam auctoritas senatus, et optimatum, deprimebatur; factio ipsius Cæsaris et Pompeii, in partes propediem scissa est. Similiter, Factio Antonii, et Octaviani Cæsaris, contra Brutum et Cassium, ad tempus aliquod duravit; sed deletis copiis Bruti et Cassii, Antonius et Octavianus, cum partibus suis, paulo post dissilierunt. Exempla hæc (dices) ad factiones bellicosas spectant, sed idem in factionibus privatis tenet. Itaque, in factionibus qui secundas antea tenebant, factione scissa, sæpius primas tenent: contra tamen, haud raro, potestate omni excidunt: complures enim in oppositione tantum valent; qua cessante, actutum deveniunt inutiles. Observatu dignum, quod sæpe evenit; plurimos nimirum, postquam voti compotes sint, et in dignitate quam ambierunt collocati; continuo se applicare contrariæ factioni; existimantes forsitan, se de alterius factionis affectu et studiis, jamdudum certos esse; itaque ad amicos novos conciliandos se comparare. Proditor in factionibus plerunque rem obtinet; postquam enim, res diutius, tanquam in æquilibrio, suspensæ hæsissent, tum demum unius alicujus in partes contrarias transitio, victoriam refert; in eumque gratiæ omnes cumulatæ. Indifferens illa inter partes processio, neutri inclinando, non semper ab animo moderato procedit; sed a consilio callido, quandoquidem proximus sibi quisque sit, atque ex utraque factione utilitatem demetere speret. Certe in Italia, in suspicionem incurrit papa, de quo vox illa, in vulgus volitat; "Padre commune." Tum etiam in signum trahitur, papam illum, omnia ad familiæ suæ amplitudinem referre, in animo habere. Regibus imprimis cavendum est, ne factioni alicui subditorum suorum, se ex professo adjungant: ligæ enim confœderationis, intra statum quempiam, monarchiis semper exitiales: siquidem obligationem introducunt obligatione ipsa imperii validiorem, atque regem constituunt; tanquam unum ex nobis: id quod cernere erat in liga Franciæ. Cum factiones, manu forti, et palam, concertant, signum est imperii in regibus labascentis; multumque præjudicat, ipsorum et auctoritati, et negotiis. Motus factionum, sub regibus, similes esse debent, motibus, (ut astronomi loquuntur,) orbium inferiorum; qui suos habent motus proprios, sed interim, conversione primi mobilis, cum obsequio, circumferuntur.

L. DE CÆREMONIIS CIVILIBUS, ET DECORO.

Qui realis solummodo est, ei multa virtute opus duco; sicut gemma, quæ sine ornamento omni inseritur, e purissimis et nitidissimus esse debet. Verum, si quis diligenter animadvertat, fit in laude, quod fit in lucro: obtinet enim proverbium illud; "Lucra levia crumenam efficere gravem." Siquidem, lucra levia frequenter redeunt, cum majora rarius se offerant. Similiter, verissimum est, virtutes exiguas magnas conciliare laudes, quia perpetuus earum usus est; tum in observationem hominum incurrunt: cum e contra, virtutis alicujus magnæ exercendæ occasio, raro admodum obtingit. Itaque ad famam et existimationem alicujus multum juvat, et, (quemadmodum Isabella, Regina Castiliana dicere solebat,) "instar epistolarum commendatitiarum, quæ nunquam non præsto sint," haberi possit; si quis formulis utetur discretis et decoris. Ad has addiscendas, nihil ferme aliud requiritur, quam ut eas quis non contemnat: ita enim in aliorum moribus easdem observabit; de reliquo autem nemo sibi diffidat. Si enim majorem illis operam navabit, de pretio decident: quod in illo potissimum situm est, ut tanquam nativæ videantur, et minime affectatæ. Nonnullorum vultus, et gestus, et externa alia, instar versus sunt, in quibus syllabæ singulæ mensurantur; qui poterit magna comprehendere, qui se tam pusillis rebus submittit? Cæremoniis decentibus, erga alios, omnino abstinere, perinde est ac si doceas, easdem illos erga te negligere; quo pacto teipsum facies viliorem. Præcipue, nequaquam omittendæ erga illos, quibuscum familiaritate minime conjunctus es: neque erga homines ingenio fastidioso. Verum, excessus in illis, et locutio plane hyperbolica, (quali nonnulli utuntur,) non solum res molesta, sed etiam fidem et pondus, eorum quæ dicuntur, omnino minuit. Est proculdubio modus, artificiosæ cujusdam insinuationis, in verbis ipsis, inter formulas communes, qui homines revera inescat, et mirifice afficit; qui eximie alicui prodest, si quis ejus viam calleat. Inter æquales, de familiaritate sollicitum esse, nihil opus est; quare reprime te paululum, et dignitatem tuam tuere: at inter inferiores non deerit reverentia; itaque inter illos, benigne te gerere, et cum familiaritate quadam, non incongruum est. Qui in sermone aliquo, aut re, nimius est, adeo ut satietatem inducat, valorem sui ipsius minuit. Aliis se applicare, bonum est; modo cum significatione

quadam fiat, hoc non ex facilitate prodire, sed ex comitate et urbanitate. Præceptum non contemnendum est; cum in alterius sententiam iveris, aliquid semper de proprio addere: exempli gratia; Opinioni ejus suffragaris? cum distinctione, et non alias, fiat: propositioni ejus annuere libet? Fiat sub modo aliquo vel conditione: consilium ejus sequi et amplecti visum est? Novi alicujus argumenti pondus addas, propter quod in partes ejus transire videaris. Cavendum imprimis, ne magister in cæremoniis et formulis, habearis: id enim si fiet, utcunque virtute vera emineas, audies tamen ab invidis, in nominis tui detrimentum, urbanus tantum et affectator. Etiam negotiis damnosum est, si quis formulas nimium affectet; vel in opportunitatibus et temporibus deligendis, impense curiosus sit. Solomon inquit; "Qui observat ventum, non seminat; et qui considerat nubes, nunquam metet;" prudens opportunitates plures faciet, quam inveniet. Mores hominum externi, vestibus eorem similes esse debent; non sint nimis concinni, nec corpus coarctantes; sed qui libertatem præbeant, ad exercitia, et motum quemlibet.

LI. DE LAUDE.

Laus virtutis reflexio est. Atque, ut fit in speculis, trahit aliquid e natura corporis, quod reflexionem præbet. Si a vulgo proficiscitur, ut plurimum, reflexio illa prava est, et falsa; et vanos potius ac tumidos, quam vera virtute præditos, comitatur. Sub captum siquidem vulgi, virtutes complures, quæ excellunt, non cadunt. Virtutes minores, ab iis, laudes extorquent; mediæ, admirationem quandam vel stuporem, illis incutiunt; sublimes autem, in sensum aut perceptionem eorum, prorsus non veniunt. Sed apparitiones virtutum, et species virtutibus similes; illos afficiunt quam maxime. Sane, fama fluvio similis est, quæ levia et inflata attollit, gravia et solida mergit. Quod si viri etiam judicii profundioris, et dignitatis, cum vulgo concurrunt, tum id, quod scriptura dicit, contingit; "Nomen bonum instar unguenti fragrantis." Omnia undique replet, neque facile evanescit. Etenim odores unguentorum, durabiles magis sunt, quam florum. Laudum tot conditiones fallaces sunt, ut laus merito in suspicionem venire possit. Laudes quædam ab adulatione sola prodeunt; quod si adulator sit vulgaris, attributis quibusdam utetur communibus, et quæ omnibus competere possint; non quæsitis aut appositis;

adulator callidior si sit, vestigia premet adulatoris principalis; intelligo, tui ipsius; et in quibus tibi places, aut teipsum excellere putas, iis adulator inhærebit maxime: sin adulator sit impudens, et perfrictæ frontis, tum demum, in quibus conscius tibi sis defectus tui, et ad quæ maxime erubescis, ea adulator tibi vel præcipue imputabit, et affiget, per vim, spreta conscientia. Laudes nonnullæ, a voluntate bona cum reverentia conjuncta, proficiscuntur; quæ sane laudum formula, principibus, et viris quibuscunque dignioribus, debetur; Laudando præcipere: cum scilicet apud illos prædicando, quales sint, humiliter moneas, quales esse debeant. Sunt qui laudibus quandoque onerantur, animo malitioso; ad conflandam invidiam, et odia concitanda, "pessimum genus inimicorum laudantium;" ut ait ille: adeo ut apud Græcos, in proverbium exierit: "Ei, qui in malum suum laudaretur, pustulam nari continuo adnaturam:" sicut apud nos vulgo dicitur; "Cum quis mentiatur, metuendum ne ejus linguæ, scabies propediem oboriatur. Illud asserere licet, laudes moderatas, tempestive irrogatas, et minime vulgares, honori vel maxime esse. Dictum est Solomonis; "Qui benedicit proximo suo voce grandi, de nocte consurgens, maledicenti similis erit;" etenim, vel hominem, vel rem aliquam, ad cœlum usque evehere, contradictionem irritat, et derisui exponit. Veruntamen, ut seipsum laudare, servato decoro, vix conceditur, nisi in casibus admodum raris; ita vocationem suam, et munus quod gerit, aut studia quibus se addixit, laudare quis cum venia possit, imo cum specie quadam magnanimitatis. Cardinales Romani, (qui theologi sunt; et fratres et scholastici,) verbum usurpant, extremi contemptus et convitii, erga negotia civilia: vocant enim negotia civilia, (veluti, belli, legationum, judiciorum, et hujusmodi,) Hispanico vocabulo, "Sbirrarias;" quod sonat, munera lictorum et scribarum. Ac si artes illæ memoratæ, magis ejusmodi homines, quam in fastigio cardinalatus positos, decerent: et tamen, (si res rite ponderetur,) speculativa cum civilibus non male miscentur. Sanctus Paulus, cum de seipso gloriatur, illud nonnunquam interponit; "Ut stultus loquor," at cum de vocatione sua verba facit, nihil veretur dicere; "Magnificabo apostolatum meum."

LII. DE VANA GLORIA.

ELEGANTER quidem Æsopus: "Musca sedens super radium rotæ currus, ita secum; quantum pulverem moveo?" Similiter, existunt quidam futiles et vani, qui, cum aliquid vel sponte procedit, vel manu potentiore cietur, si modo ipsi vel minimam rei partem attigerint, continuo putant se machinam totam vertere. Gloriosi semper factiosi; etenim nulla ostentatio sine comparatione sui est. Quin et violenti ut sint, necesse est, ut quæ verbis jactitarunt, revera præstent. Neque taciturni omnino esse possunt; ideoque opere, ut plurimum, destituuntur; sicut Gallis in proverbium abiit; "Beaucoup de bruit, peu de fruit:" Strepitus multum, fructus parum. Attamen, sine controversia, hujusmodi ingeniis, in civilibus, aliquando uti prodest. Si fama excitanda sit, vel opinio late spargenda, sive virtutis, sive potentiæ, istiusmodi homines buccinatores egregii sunt. Rursus, sicut prudenter notat Livius, circa tractatus Antiochi et Ætolorum; "Mendacia reciproca, et ex utraque parte, quandoque magno usui esse possunt;" veluti, cum quis inter principes duos negotietur, ut eos ad bellum indicendum, principi tertio concitet; atque hoc ut efficiat, unius copias apud alterum, supra modum, et veritatem, vicissim attollat. Quin et hoc fit quandoque, ut qui inter privatos tractet, apud utrunque existimationem suam augeat, artificiose insinuando, se apud alterutrum plus posse, quam revera potest. Atque in his, et hujusmodi haud raro accidit, ut aliquid ex nihilo producatur: mendacia enim opinionem ingenerare sufficiunt; opinio autem rem et substantiam progignit. In ducibus, et viris militaribus, gloriosum esse, non inutile est; sicut enim ferrum acuit ferrum, ita per gloriam hanc animi invicem acuuntur, et excitantur. Insuper, in actionibus magnis, quæ sumptibus, et periculo privatorum, suscipiuntur, ingenia jactabunda vivacius negotia impellunt: qui enim ingenio sobrio sunt, et solido, plus habent saburræ, quam veli. Rursus, in existimatione doctrinæ et literarum cujuspiam, non volitabit fama illius per ora virum, neque bene alata erit, sine plumis aliquibus ostentationis. "Qui de contemnenda gloria libros scribunt, nomen suum inscribunt;" inquit ille Socrates, Aristoteles, Galenus, (magna nomina,) ingenio jactabundo erant. Certe gloria vana, ad propagandam et perpetuandam memoriam magnopere juvat: neque virtus

ipsa, tantum humanæ naturæ debet, propter nominis sui celebrationem, quantum sibi ipsi. Fama siquidem Ciceronis, Senecæ, Plinii Secundi, ad hunc usque diem vix durasset, aut saltem non tam vegeta, nisi conjuncta fuisset, cum aliqua vanitate et jactantia, in seipsis. Jactantia enim, instar vernicis videtur esse, quæ ligna non solum splendere facit, verum etiam durare. Atqui, dum hæc de vana gloria dissero, minime eam qualitatem intelligo, quam attribuit Tacitus Muciano: " Omnium, quæ dixerat, feceratque, arte quadam ostentator: " hæc enim ex vanitate neutiquam procedit, sed ex arte, et prudentia, cum magnanimitate quadam conjuncta: et in aliquibus hominibus, qui natura veluti comparati ad eam sunt, res est, non solum decora, sed et gratiosa. Excusationes enim decoræ, concessiones tempestivæ, quin et modestia ipsa bene temperata, nihil aliud sunt, quam ostentationis artes. Neque inter artes hasce, reperitur aliqua felicior, quam illa, de qua loquitur Plinius Secundus, hoc est; liberaliter et copiose id in aliis laudare, in quo ipse emineas. Nam ad hunc modum ille, ingeniose satis: " In alio laudando, tibi ipsi ministras: is enim, quem laudas, aut superior tibi est, aut inferior; si inferior, et tamen laudandus, tu multo magis; si superior, neque jure laudandus, tu multo minus." Gloriosi prudentibus derisui sunt; stultis admirationi; parasitis prædæ et escæ; sibi ipsis, et gloriæ vanæ, mancipia.

LIII. DE HONORE ET EXISTIMATIONE.

Honoris et existimationis, vera, et jure optimo, acquisitio, ea est; ut quis virtutes, et facultates suas, dextre, et absque detrimento, revelet. Nonnulli enim, in actionibus suis, proci famæ sunt, et veluti venatores: quod genus hominum, sermonibus plerunque celebratur, sed interiorem animi reverentiam vix assequitur. Alii, contra, virtutem suam, inter monstrandum, obscurant; ex quo fit, ut opinione minores sint, quam merita ipsorum postulant. Si quis rem suscipiat, simulque perficiat, quæ prius intentata fuerat; aut tentata quidem, sed deserta; aut ad exitum forsan perducta, sed minus commode, et feliciter; is honorem adipiscetur majorem, quam si quid perfecisset gravioris sane difficultatis, et momenti; sed in quo, alterius tantum vestigia, et non ultra, premeret. Si quis actiones suas, ita inter se committat, et contemperet, ut in aliquibus earum,

singulis factionibus, vel populi combinationibus, satisfaciat, harmonia erit tanto perfectior. Honoris sui minime frugalis dispensator est, qui rem quamvis suscipit, in qua dedecoris plus fuerit, votis excidere, quam obtinuisse, honoris. Honor, qui comparativus est, et alium prægravat, reflexionem habet maxime vividam; instar adamantis, aut carbunculi, cum angulis multiplicibus secti. Itaque, enixe hoc agas, ut competitores tuos, si modo possis, etiam in iis, in quibus ipsi summe gloriantur, superes. Servi, et amici familiares, prudentes modo sint et cauti, existimationi cujuspiam, non modicum prosunt: ita Quint. Cicero: "Omnis fama a domesticis emanat." Invidia, quæ honoris veluti tinea et teredo est, optime extinguitur, si quis id sibi præstituere videatur, ut meritum potius ambiat, quam famam: et successus suos prosperos, magis providentiæ divinæ, et felicitati cuidam tribuat, quam artibus aut virtutibus propriis.

Gradus, honoris imperialis, sic vere et optime ordinantur. Primo loco statuendi, conditores imperiorum; quales fuerunt Romulus, Cyrus, Julius Cæsar, Ottomannus, Ismael. Secundo loco, legum-latores; qui etiam vocabantur conditores secundi, aut perpetui principes; quoniam legibus suis, etiam post mortem, imperia administrant; quales fuerunt Lycurgus, Solon, Justinianus, Eadgarus, Alphonsus Castilianus, cognomine sapiens, qui septem partitiones edidit. Tertio loco, liberatores, vel servatores patriarum suarum; qui bellis intestinis diutinis finem imposuerunt, aut patrias, a servitute alienigenarum, vel tyrannorum liberarunt: veluti, Augustus Cæsar, Vespasianus, Aurelianus, Theodoricus, Henricus Septimus rex Angliæ, Henricus Quartus rex Galliæ. Quarto loco, propagatores, sive propugnatores imperii; qui bellis honorificis fines imperii protulerunt; vel defensione strenua et nobili, invasoribus restiterunt. Ultimo loco, patres patriæ; qui juste imperant, et temporibus felicibus, quamdiu vivunt, cives suos beant. In his ultimis duobus, exempla non adduco, quandoquidem tanto numero sint. Honorum, qui subditis competere possunt, gradus hi sunt. Primo statuendi participes curarum; ii nimirum, quorum humeris, præcipuum pondus, rerum suarum, principes imponunt: vulgo appellamus manus regum dexteras. Secundo, duces belli; regum suorum intelligo locum-tenentes; qui operam eis egregiam in bellis præstant. Tertio, gratiosi; eos volo, qui non ultra hoc potes sunt, quam ut principibus solatio sint, et populo innoxii. Quarto, negotiis pares; qui magnos sub princi-

pibus gerunt magistratus; in quibus juste et prudenter versantur. Est et genus quoddam honoris, quod raro contingit; et tamen inter maximos reponi meretur: hic est, eorum, qui se morti, et periculis, devovent, et sacrificant, propter bonum patriæ: quod fecerunt Marcus Regulus, et duo Decii.

LIV. DE OFFICIO JUDICIS.

Meminisse debent judices, esse muneris sui, jus dicere, non autem jus dare: leges inquam interpretari, non condere. Aliter, deveniet eorum auctoritas, simile quiddam, auctoritati illi, quam sibi vendicat ecclesia Romana: quæ prætextu interpretationis Scripturum, etiam addit aliquid quandoque, et immutat: et pronunciat, quod non invenit; atque specie antiquitatis, introducit novitatem. Judicem oportet esse, potius eruditum, quam ingeniosum; venerabilem, quam gratiosum; magisque deliberativum, quam confidentem. Ante omnia, integritas judicum quasi portio est, virtusque propria. "Maledictus sit (inquit lex) qui terminum terræ movet antiquum;" sane, qui lapidem, fines distinguentem, transponit, culpa non caret. Verum judex injustus ille est, qui præcipue terminos immutat, cum de terris et rerum proprietate, iniquam fert sententiam. Una certe iniqua sententia plus nocet, quam exempla plurima. Hæc enim, rivulos tantum inficiunt, illa autem fontes. Ita ait Salomon; "Fons turbatus, et vena corrupta, est justus cadens, in causa sua, coram adversario." Officium judicis relationem habere possit, partim ad litigantes; partim ad advocatos; partim ad scribas et ministros justiciæ subtus; partim ad principem vel statum supra.

Primo quantum ad causas et litigantes. "Sunt (inquit Scriptura) qui judicium vertunt in absynthium:" sunt etiam certe, qui illud vertunt in acetum. Injusticia enim illud reddit amarum; mora acidum. Judex strenuus, hoc præcipue agit, ut vim et dolum, compescat: quorum vis magis perniciosa est, quanto apertior; dolus quanto tectior et occultior. Adde etiam lites contentiosas; quæ evomi debent, ut crapula curiarum. Judicem decet, viam parare ad justam sententiam, qualem Deus parat: "Valles exaltando; colles deprimendo:" eodem modo, quando ex alterutra parte, videt judex, manum elatam, veluti in prosecutione importuna, captionibus malitiosis, combinationi-

bus, patrocinio potentum, advocatorum disparitate, et similibus, tum elucescit virtus judicis in æquandis iis, quæ sunt inæqualia; ut judicium suum, veluti in area plana, fundare possit. "Qui fortiter emungit, elicit sanguinem;" cumque torcular vini premitur fortius, vinum prodit acerbum, acinum sapiens. Itaque caveant sibi judices, ab interpretationibus legum duris, et illationibus alte petitis: neque enim pejor est tortura, quam tortura legum. Præcipue in legibus pœnalibus, curæ iis esse debet, ne quæ in terrorem latæ sunt; vertantur in rigorem: neve in populum superinducant, imbrem illum, de quo Scriptura: "Pluet super eos laqueos." Etenim leges pœnales, si severe executioni demandentur, sunt similes imbri laqueorum, cadenti super populum. Itaque hujusmodi leges, si vel dormiverint diu, vel temporibus præsentibus minus quadrent, a judicibus prudentibus, in executione earum, reprimantur:

Judicis officium est, ut res, ita tempora rerum, etc.

In causis capitalibus, decet judices (quantum lex permittit,) in judicio meminisse misericordiæ; et cum severitate exemplum, cum pietate personam, intueri.

Quantum ad advocatos qui causas agunt; patientia, et gravitas, in causis audiendis, justitiæ est pars essentialis; et judex nimium interloquens minime est cymbalum benesonans. Non laudi est judici, si primus aliquid in causa inveniat, et arripiat, quod ab advocatis, suo tempore, melius audire potuisset: aut acumen ostentet, in probationibus, vel advocatorum perorationibus nimis cito interrumpendis: aut anticipet informationes quæstionibus, licet ad rem pertinentibus. Judicis partes in audiendo sunt quatuor: probationum seriem ordinare; advocatorum, et testium, prolixitatem, repetitionem, aut sermones extra rem, moderari; eorum, quæ allegata sunt, medullam, et quæ majoris momenti sunt, recapitulare, seligere, et inter se componere; et demum sententiam ferre. Quicquid ultra hæc est, nimium est; et oritur aut a gloriola et loquendi aviditate; aut ab audiendi impatientia; aut a memoriæ debilitate; aut a defectu attentionis sedatæ, et æquabilis. Sæpenumero mirum est visu, quantum advocatorum audacia apud judices valeat; ubi contra judices ad imitationem Dei, (in cujus tribunali sedent,) "Superbos comprimere, et humiles erigere," deberent. Sed etiamnum magis mirum est, judices advocatis quibusdam præ cæteris immoderate et aperte favere. Quod necesse est, ut merces advoca-

torum augeat et multiplicet, atque simul suspicionem corruptionis, et obliqui ad judices aditus, inducat. Debetur advocato a judice, laus aliqua, et commendatio, cum causæ bene aguntur, et tractantur; præsertim, si causa sua cadat; hoc enim apud clientem, existimationem advocati sui tuetur, et simul opinionem ejus, de causa sua, prosternit. Debetur etiam reipublicæ reprehensio advocatorum moderata, ubi callida nimis præstant consilia; aut supina apparet negligentia, aut levis informatio, aut indecora importunitas, aut impudens defensio. Advocatus autem illud tribuat judici, ne illi obstrepat, aut se rursus in causam agendam callide insinuet, postquam judex de re pronunciaverit. E contrario autem, judex se causæ mediæ, et nullatenus peroratæ, non ingerat; nec clienti occasionem præbeat, ut advocatos suos, vel probationes, ad plenum non auditas conqueratur.

Quantum ad scribas et ministros. Sedes justitiæ, veluti locus sacratus est; ubi non tantum sedes ipsa, sed et subsellia, et præcinctus sedis, scandalo et corruptelis vacare debent. Etenim (ut ait Scriptura) "Non colliguntur uvæ ex spinis;" neque justitia suaves suos fructus edere potest, inter vepres et dumeta, scribarum et ministrorum rapacium, et lucris inhiantium. Curiarum asseclæ pravi sunt quatuor: primo seminatores litium; qui curias tumescere faciunt, populum tabescere. Secundo, qui curias contentionibus circa jurisdictionem implicant; neque vere sunt, (ut habentur) amici curiæ; sed parasiti curiæ; curias inflando ultra terminos, propter micas et compendia propria. Tertio, ii, qui possunt censeri tanquam curiarum manus sinistræ: homines, qui curiarum processus legitimos, diverticulis, et versutiis, distorquent; justitiamque in lineas obliquas, et labyrinthos, trahunt. Quarto, expilatores et exactores feodorum, qui tritam similitudinem confirmant curiarum ad rubum; quo dum ovis, tempestatem fugiens, se recipit, velleris partem amittit. Contra, scriba antiquus, in anteactis curiarum peritus, in actis ipsis concipiendis cautus, et in negotiis curiæ solers, digitus est curiæ egregius; et sæpe judici ipsi viam monstrat.

Quantum vero ad principem aut statum. Judices, ante omnia, in memoria fixum tenere debent, versiculum ultimum Duodecim Tabularum Romanarum: "Salus populi suprema lex;" et pro certo ponere, leges, nisi sint in ordine ad eum finem, res esse captiosas, et oracula male inspirata. Itaque, bene succedit, cum rex aut status sæpius cum judicibus deliberat; et rursus, cum judices prin-

cipem et statum sæpius consulant. Ille, cum inter deliberationes politicas interveniat quæstio juris: hi, cum in subjecto legali interveniant considerationes status. Contingit enim, haud raro, ut res in judicium adducta, versetur circa meum et tuum, et nihilominus consequentia ejus ad rationes status penetret. Intelligo autem, ad rationes status pertinere, non solum, si quid ad jura regalia impetenda spectet, verumetiam si quid innovationem aliquam minus tutam, aut exemplum periculosum, introducat; aut si manifesto portionem aliquam populi majorem gravet. Neque quisquam infirmi judicii existimet, justas leges adversus politica vera aliquid antipathiæ habere. Sunt enim hæc duo veluti spiritus et nervi, quorum alteri in alteris moventur. Recordentur etiam judices, Salomonis thronum leonibus utrinque suffultum fuisse: sint sane leones, sed leones sub throno; caventes, ne aliquid ex juribus regalibus impetant aut convellant. Postremo, ne sint judices tam ignari juris et prærogativæ suæ, ut cogitent, non sibi relinqui, tanquam muneris sui partem principalem; sanum et prudentem legum usum, et applicationem. Etenim in animum revocare poterint, dictum illud apostoli, de lege humanis legibus majore: "Nos scimus quia lex bona est, modo quis ea utatur legitime.

LV. DE IRA.

Iram penitus extinguere velle, ostentatio quædam Stoicorum est. Meliora nos nacti sumus oracula: "Irascimini, et nolite peccare; sol non occidat super iracundiam vestram." Limites iræ apponendi sunt, et quousque, et quamdiu. Dicemus primo, quibus modis, inclinatio naturalis, aut etiam habitus iræ, temperari possit, et leniri. Secundo, qualiter particulares motus iræ reprimi possint, aut saltem citra nocumentum cohiberi. Tertio, quibus modis ira excitari possit, aut sedari in aliis.

Quantum ad primum; non alia se ostendit via, quam ut serio in animo revolvas mala et calamitates iræ; et quam vehementer vitam humanam perturbat, et infestat. Hoc autem tempestivum fuerit, maxime si pone nos respiciamus, quamprimum impetus iræ resederit. Eleganter Seneca: "Iram ruinæ similem esse, quæ in aliud cadendo, seipsam comminuit et frangit." Hortatur Scriptura: "Ut animas nostras in patientia possideamus." Certe, qui-

cunque patientia excidit; de animæ suæ possessione dejicitur. Hominis non est apes imitari:

—— Animasque in vulnere ponunt.

Ira sane, si quis recte attendat, res humilis est, et infra dignitatem hominis. Hoc liquebit, si illos intueamur, in quibus ira regnat: qui plerunque ex infirmioribus sunt; pueri, mulieres, senes, ægroti. Itaque, cum irasci contigerit, caveant homines, (si modo dignitatis suæ velint esse memores,) ne iram suam, cum metu eorum quibus irascuntur, sed cum contemptu, conjungant; ita ut injuria superiores potius videantur, quam inferiores: quod non difficile factu foret, si quis iram suam paululum regat, et inflectat.

Quantum ad secundum; causæ et motiva iræ præcipue tres sunt. Primo, si quis pronus sit ad sensum injuriæ; nemo enim irascitur, nisi qui se læsum sentiat. Itaque teneri qui sunt, et delicati, ut subinde irascantur, necesse est: tot se offerent, quæ illis molestiam exhibebunt; quæ a naturis robustioribus vix sentientur. Secundo, si quis curiosus et perspicax sit in interpretatione injuriæ illatæ, quatenus ad circumstantias ejus, ac si contemptum spiraret. Opinio enim contemptus iram excitat et acuit, plusquam læsio ipsa. Itaque, si homines ad ista ingeniosi sint, iram miris modis incendent. Ultimo, opinio contumeliæ, sive quod existimatio hominis per consequentiam lædatur et perstringatur, iram intendit et multiplicat. Cui rei accedit remedium præsentaneum, ut quis utatur, (quod Consalvus dicere solebat,) tela honoris crassiore: sed in omnibus iræ frænationibus, optimum est, tempus lucrari; et sibi ipsi persuadere, horam vindictæ nondum adesse; sed instare, quasi ad manum, opportunitatem aliquam majorem; atque hoc pacto motum animi interim compescere, et se in tempus aliud servare. Ira autem, ut citra noxam erumpat, utcunque hominem obsederit, duo sunt, quæ maxime cavenda. Prius est, acerbitas verborum, præcipue aculeatorum, et ei, quem ferimus, propriorum, communia enim maledicta mordent minus. Atque rursus, secretorum revelatio; hoc enim societati quemvis ineptum reddit. Posterius est, ne quis, dum ira fervet, negotium, quod in manibus est, abrumpat; sed utcunque iræ frænum laxet, nihil tamen agat, quod revocari non possit.

Quantum ad excitandam, aut sedandam, iram in aliis; fit hoc maxime per temporum electionem prudentem. Cum

subtristes homines sunt, aut aliquantulum morosi, tempus est iram incendendi. Deinde, ut antea diximus, decerpendo, et inculcando, quicquid contemptum arguere, aut aggravare possit. Rursus, ira sedatur per contraria hisce. Primo, deligendo tempora serena, et ad hilaritatem prona, in quibus negotium aliquod ingratum, et ad iracundiam provocans, aperias: prima enim impressio plurimum valet. Deinde, ut, quantum fieri potest, injuriam a contemptu segreges; eam imperitiæ, timori, animi concussioni repentinæ, aut simili cuipiam imputando.

LVI. DE VICISSITUDINE RERUM.

Salomon inquit; "Nihil novum super terram." Itaque, quemadmodum Plato opinatus est; "Omnem scientiam nihil aliud esse, quam reminiscentiam;" sic Salomon pronunciat; "Omnem novitatem nihil aliud esse, quam oblivionem." Ex quo cernere possis, fluvium lethes, non minus super terram, quam subter teram, decurrere. Astrologus quidam abstrusus, et parum notus, asserit: "Nisi in causa fuissent res duæ constantes; (una, quod stellæ fixæ æqualem inter se distantiam perpetuo servent; nec unquam propius sibi invicem accedant, aut longius a se abscedant: altera, quod motus diurnus non variet, ne momentum quidem temporis) individuum aliquod durare potuisset." Illud certum est, materiam in perpetuo fluxu esse, neque unquam consistere. Atqui, magna illa lintea sepulchralia, quæ omnia oblivione involvunt, duo sunt; diluvia et terræmotus. Quatenus ad conflagrationes, et siccitates magnas, illæ populum penitus non absorbent, aut destruunt. Fabula Phaetontis, brevitatem conflagrationis, ad unius tantum diei spatium, repræsentavit. Atque triennalis illa, a pluvia cessatio, tempore Eliæ, particularis tantum fuit, et multos superstites reliquit. Incensiones illas loqueris, quæ per fulmina et fulgura apud Indias Orientales fiunt! Angustæ quidem sunt, nec magna spatia occupant. Pestilentias etiam prætereo, quia nec illæ totaliter absorbent. Verum, in memoratis illis duabus calamitatibus, (diluviorum, et terræ-motuum,) insuper notandum est; reliquias populorum, quas emergere contigerit, plerunque homines rudes et montanos esse; quique temporum præteritorum memoriam posteris tradere non possint; adeo ut oblivio non minus omnia involvat, quam si nulli prorsus superstites

remanerent. Si quis attente introspiciat Indorum Occidentalium conditionem, probabile reperiet, eos populum juniorem esse et recentiorem, quam populos orbis veteris. At longe verisimilius est, desolationem illam, quæ illos olim invaserat, minime per terræ-motus factam: (contra quam narrabat sacerdos Ægyptius, in colloquio cum Solone, de insula Atlantide; eam, scilicet, a terræ-motu absorptam esse;) sed potius per diluvium particulare. Terræ-motus enim in illis regionibus raro eveniunt. Verum, e contraria parte, tam immania plane et vasta habent flumina, ut fluvii Asiæ, Africæ, et Europæ, præ illis, instar rivulorum sint. Quin et Andes ipsorum, sive montes, nostris longe sunt altiores: unde credibile est, reliquias stirpis hominum, apud eos, post tale diluvium particulare, conservatas fuisse. Quantum vero, ad observationem Macciavelli; nimirum, zelotypiam et æmulationem sectarum, ad extinguendam rerum memoriam, multa molitam: qui Gregorio magno notam inurit, ac si pro viribus suis antiquitates omnes ethnicorum supprimere annixus fuerit: non video certe hujusmodi zelos, aut notabile quidpiam efficere, aut diu durare: id quod liquet in successione Sabiniani, qui antiquitates easdem statim resuscitavit: tum vero prohibita, licet tenebris cooperta, obrepunt tamen, et suas nanciscuntur periodos.

Vicissitudines sive mutationes in globo superiori, fusius, in hoc sermone, tractandæ non sunt. Forsitan, annus magnus Platonis, nisi mundus ante dissolutioni esset destinatus, aliquem sortiri possit effectum: non in renovandis corporibus individuorum; (id enim fumus et vanitas eorum est, qui opinantur corpora cœlestia, accuratiores in hæc inferiora habere influentias, quam revera habent;) sed tantum in summis et massis rerum. Cometæ proculdubio aliquid operantur super easdem summas et massas rerum; verum, homines, ut nunc est, indiligentes, aut curiosi, circa eos sunt; eosque potius mirabundi spectant; atque itineraria eorundem conficiunt, quam effectus eorum prudenter et sobrie notant; præcipue effectus eorum comparativos; id est, cometa talis magnitudinis; talis coloris et lucis; conversionis radiorum; situs, quatenus ad regionem cœli; tempestatis anni; semitæ aut cursus; durationis; quales producat effectus.

Leviculum quiddam est, quod olim inaudiveram; neque tamen prorsus contemni volo, sed in observationem aliquam venire. Ferunt, a Belgis notatum esse, singulis septenis

lustris, similem annorum temperaturam et tempestatum cœli, velut in orbem redire: exempli gratia; magnas glacies, inundationes magnas, magnas siccitates, hyemes tepidas, æstates frigidiores; et similia. Vocant autem hujusmodi circulum annorum, Primam. Hoc autem ideo recenseo, quod oculos in præterita conjiciens, hujusce rei inveni congruentiam; haud exactam sane, sed non multum discrepantem.

Verum transeamus a naturalibus ad humana. Maxima apud homines vicissitudo, est illa sectarum et religionum. Hi enim orbes, animis hominum, maxime dominantur. Religio vera super petram ædificata est; reliquæ fluctibus temporum agitantur. Dicamus igitur de novarum sectarum causis; atque consilii aliquid circa eas inspergamus; quatenus humani ingenii infirmitas, tantis revolutionibus, moras injicere, aut remedia exhibere, poterit.

Quando religio recepta discordiis laceratur; sanctitas item professorum labefactata est, et scandalo exposita; simulque tempora stupida, indocta, et barbara sunt; a novæ alicujus sectæ ortu merito metuendum; præcipue, si eo tempore, ingenium aliquod intemperans, et paradoxa, spirans, suboriatur. Quæ omnia tenuerunt, Mahometes cum legem suam promulgavit. Secta nova licet pullulet, duobus si destituatur adminiculis, ab ea non metuas; non enim late se diffundet. Primum est, imperii, sive auctoritatis stabilitæ, oppugnatio; nihil enim magis populare est, quam principatus, et politias, convellere. Alterum est, porta luxuriæ et voluptatibus aperta: hereses enim speculativæ, (qualis fuit olim Arrianorum, et hodie Arminianorum,) etsi in hominum ingenia miris modis operentur, statum tamen rerumpublicarum non magnopere concutient, nisi ex occasione motuum civilium. Modi tres sunt, quibus novæ sectæ plantantur; miraculis, eloquentia, et gladio. Equidem martyria inter miracula numero; quoniam vires naturæ humanæ excedere videntur: idem etiam facere licet, de excelsa illa et admirabili vitæ sanctimonia. Certe, non alia melior via est, ad sectarum et schismatum ortus repellendos, quam abusuum reformatio; dissidiorum minorum pacificatio; leniter a principio procedere, et a sanguinariis persecutionibus abstinere; schismatum denique coryphæos, favoribus potius et dignitatibus mollire atque allicere, quam violentia et sævitia exacerbare.

Mutationes et vicissitudines in rebus bellicis, haud paucæ sunt; sed præcipue in tribus versantur: in sede belli; in

genere armorum; et in disciplina militari: bella, antiquis temporibus, movere videbantur, ex oriente potissimum in occidentem: etenim Persæ, Assyrii, Arabes, Scythi, (qui invasores erant,) omnes orientales fuerunt. Verum est Gallos fuisse occidentales: sed de duabus tantum ipsorum incursionibus legimus; una in Gallo-Græciam, altera contra Romanos. Attamen oriens et occidens cœli climata non determinant; neque etiam belli motus, ab oriente, aut ab occidente, aliquid certæ observationis recipiunt. Sed meridies, et septentrio, natura fixi sunt: atque raro, in omni memoria invenitur, meridionales interiores invasisse septentrionales; sed e contra. Unde manifestum est, tractum mundi septentrionalem, natura ipsa, magis esse bellicosum; sive hoc ascribi possit hujus hemispherii stellis; sive amplitudini continentium ad partes septentrionales, cum partes australes, (quantum adhuc innotuit,) maria fere occupant; sive, (id quod manifestissimum est,) frigoribus climatis borealis; nam hoc ipsum, absque alia causa quacunque, corpora indurat, spiritus inflammat: ut liquet in populo Araucensi; qui ad ulteriora austri positi, omnibus Peruviensibus, fortitudine longe præcellunt.

Imperio aliquo magno labascente, et viribus fracto, pro certo bella expectes. Etenim imperia magna, dum in vigore sunt, copias nativas provinciarum enervant et destruunt, propriis cohortibus domi fidentia; cum autem et illæ deficiunt, omnia ruunt, atque aliis gentibus in prædam cedunt. Hoc evenit in declinatione imperii Romani; atque etiam in imperio occidentali, post Carolum magnum, cum aves singulæ plumas suas repeterent; atque simile quidpiam, etiam imperio Hispano, contingere possit, siquando viribus decideret. Ex altera parte, accessiones magnæ ditionum, et uniones regnorum, similiter bella suscitant: etenim, cum status aliquis in potentiam majorem insurgit, similis est fluvio intumescenti, qui inundationem statim minatur: ut videre est in imperiis Romanorum, Turcarum, Hispanorum, et aliorum. Attende, cum mundus nationibus barbaris minus abundet, sed civiliores fere sunt; qui uxores temere non ducent, nec liberos progignent, nisi modum familiam alendi, aut saltem victum parandi, prævideriint; (ut fit in omnibus prope nationibus, hodierno die, exceptis Tartaris,) non ingruit periculum ab inundationibus aut migrationibus populorum: at cum populorum greges magni sunt, qui perpetuo sobolem suscipiunt, de fortunis

et sustentatione sua in futurum minime solliciti; necessarium est, ut in seculo uno aut altero, portionem aliquam multitudinis suæ exonerent, et novas sedes quærant; et sic alias nationes invadant; quod populi septentrionales veteres sorte facere solebant: sortes dantes, quæ pars domi maneret, quæ autem alio migraret. Cum gens aliqua, prius Bellicosa, ad mollitiem et luxuriam degenerat, de bello certa esse possit: status enim tales, plerunque, dum degenerant, opes accumulant; adeo ut præda invitet, et declinatio virium animet, gentes alias, ad eosdem invadendos.

Quantum ad armorum et telorum genus; illorum mutationes sub observationem vix cadunt: attamen et hæc ipsa periodos et vicissitudines suas sortiuntur. Pro certo enim est, tormenta ænea, apud urbem Oxydracarum in India, tempore Alexandri Magni, cognita fuisse; eaque a Macedonibus, tonitrua, et fulgura, et operationes magicas, habita et appellata. Similiter, indubitatum est, usum pulveris pyrii, and tormentorum igneorum, Chinensibus, ante annos bis mille, innotuisse. Conditiones telorum, et mutationes in melius, hæ sunt: primo, ut ad distantiam majorem feriant: id enim periculum, ab hostili parte, anticipat; quod certe tormenta, et sclopeta majora præstant. Secundo, ut impetus eorum fortior et validior sit; in quo genere, tormenta ignea, arietationes omnes et antiquas machinas, item superant. Tertio, ut usus eorum commodior et facilior sit; id quod etiam tormentis igneis majoribus competit: quæ omnibus tempestatibus idonea; vectura levia et mobilia sunt: et his similia.

Quod ad militiam attinet: antiquis temporibus numerum præcipue curabant; virtuti et animis militum, in bellis gerendis, fidebant; dies sæpius et loca præliandi constituebant, et æquo marte experiebantur; denique in acie instruenda et ordinanda imperitiores fere erant. Postea, numerum præoptabant commodum potius quam vastum; locorum opportunitates, diversionum artificia, et similia, captabant; postremo, in acie ipsa instruenda peritiores evadebant.

In reipublicæ alicujus adolescentia arma florent; ætate media literæ; ac deinceps, ad moram aliquam, duo illa simul, florere solent: devexa autem ætate, artes mechanicæ et mercatura. Literæ vero suam habent infantiam, quando leviusculæ sunt, et pueriles: sequitur earum adolescentia, quando luxuriantur, et juvenile quiddam sapiunt: suc-

cedit ætas virilis, quando solidiores et exactiores deveniunt; postremo senectus earum obrepit, cum siccæ et exhaustæ fiunt; manente tamen garrulitate. Verum consultum non fuerit, in rotas hasce vicissitudinum, nimis longum oculos figere; ne vertigine corripiamur. Quatenus vero ad philologiam, quæ in hoc argumento, ut plurimum, versatur, nihil aliud est, quam narratiuncularum et observationum futilium congeries quædam; ideoque scripto huic minime congruit.

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END OF THE FIFTEENTH VOLUME.

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